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A CLINICAL AND OPERATIVE CONSIDERATION OF TRAUMATIZED BILE DUCTS.*

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We are indebted to Arthur Sullivan† of Madison, Wisconsin, since 1909, for a great stimulus in the repair of traumatized bile ducts. Since his publication numerous contributions to the literature have been made, the greater proportion, however, devoting themselves to the early literature and few to the patient and his repair. My record is a repair in eight instances, one being a second operation due to cicatricial closing of the newly formed way in less than eleven months. This patient, her trauma, her first and second repair, and her subsequent bringing suit with success against the unfortunate operator in another state, have caused me to give much thought to the subject in more ways than that of surgical repair.

To grasp properly the cause of accidental trauma, outside of sheer recklessness or stupidity, one must consider the anatomy of the structures directly concerned in both accidental and unavoidable trauma. In the latter, the unavoidable causes, one must consider inflammatory conditions and new growth.

In the anatomy we must bear in mind the course that the cystic duct pursues. There are three major courses by which the cystic duct may approach its union with the hepatic, the spiral, the parallel, and that of the acute angle being usually described in works on anatomy. It requires no great imagination to see how one can grasp the spirally implanted cystic with the common or hepatic duct, especially if the spirally curved cystic unites on the opposite side or under the main duct. The parallel duct, lying upon or to the side of the main duct is or may be so closely adherent, due to adhesions or cellular tissues binding it to the common or hepatic duct, as to deceive one, and unless great care is taken in its release, the common duct will be lifted from its bed and clamped off. While the acute angle type obtains in the majority of instances yet the angle may vary so as to be a distinct source of error.

The various lengths of the cystic duct must also be thoroughly understood. A short cystic duct may lead to a lateral grasp, either by clamp or ligation of the common duct, and thereby produce a compression slough of the walls of the common duct sufficient to prevent spontaneous repair. To obviate the danger of injury to the duct one must thoroughly demonstrate the cystic duct in its continuity from the gall-bladder down. This is easily done in the majority of instances by splitting the peritoneum on the right side over the gall-bladder about one-half to one inch from its hepatic bed. The gall-bladder can then be elevated and rotated on its long axis so that the underlying structures can readily be demonstrated. The cellular tissue can then be pushed aside, demonstrating the terminal Krause pouch and the beginning cystic duct. With the fibroid changes seen in some of the long-standing and recurring infectious varieties, great care must be exercised as this type of new-formed tissue may be found to extend into the common duct. The slightest mishap in dissection in such will produce all the damage imaginable.

The arterial supply is sufficiently presented in its vagaries both by our anatomical text-books and by the more recent articles of Eisendrath and others. Too great care cannot be exercised in approaching the cystic artery, and in the event of hemorrhage by tear, slipping of clamp, etc., the most thorough care must be sustained in finding the bleeding point. I am quite convinced that in an attempt to stem a sudden hemorrhage, either real or imagined, mass grasping by means of an artery clamp has included the duct. One should never allow the assistant to attend to deep hemorrhage. In the medico-legal case, the question of destruction of the blood vessel supply arose as follows: "May not the clamping or tying of the vessel produce a thrombosis extending into the minute vessels or the main vessels of supply of the duct, thereby producing a true surgical slough?"

Among the pathological causes non-neoplastic, the atrophied or contracted gall-bladder has its share in producing trauma, as well as has the thickened and fibroid infiltrated type. Gangrenous extension obtains by the same routes as does gangrenous extension seen occasionally into the cecum from a

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†Reconstruction of the Bile Ducts, *Journal of the A. M. A.*, 1909, **53**, 774. Reconstruction of the Bile Ducts, *Wisconsin Med. Jour.*, 1910-11, **9**, 586.

gangrenous appendix. Ulceration from biliary calculi may be productive of stricture formation or destruction of the duct wall sufficient to produce obliteration of a part of the continuity of the duct. In addition to the trauma caused by anatomical abnormalities, there are those induced by the operator. For instance, the placing of ligatures too close to the common duct or the infolding by the ligatures of a part of it, larger than will normally repair, or that may repair leaving a distinct stricture or producing a definite contracture, each of which may in a short time be followed by occlusion.

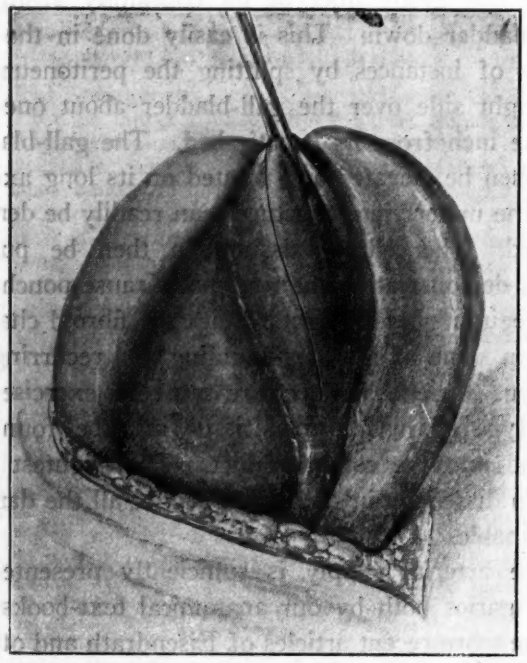

Fig. 1. Cholecystectomy. Step in method to prevent injury to the common and hepatic ducts: incising the peritoneum on the right side of the gall-bladder.

The incision for choledochostomy should be in the long axis of the duct and not transverse. Great care should be exercised in the use of forceps or the finger when entering the common duct for stones not to tear the duct transversely. This applies also to the use of the stitch in securing a drainage tube in the duct when necessary. Such an accident in a very fat and large woman occurred in my service a year ago. While I was placing the needle in the wall of the duct, the patient attempted to vomit. This resulted in a tear of the common duct fully one-fourth of its circumference in addition to my longitudinal cut. Several stitches were required. After six or seven weeks of great anxiety on my part the fistula closed. Grasping the common duct as mentioned before for some anatomical anomaly or from lack of recognition by the operator, may cause injury. I am quite satisfied from my series of cases that the teachings that, after cholecystectomy, the remaining stump of the cystic duct as well as the entire common duct dilate, may have had to do with trauma of the duct, because the operators in their attempts to make a perfect cholecystectomy have gone to the extreme of dissecting the cystic duct to its common duct union, thereby jeopardizing the integrity of the common and hepatic duct, both in its vascular supply and as a direct ductal wall involvement.

When the vessels slip, either through the forceps blades or from the ligature, careful pressure and grasping the edges of the area guardedly with forceps so that the well of blood is readily outlined will often give access to the bleeding point. No suture should be applied deeply for hemorrhage until one

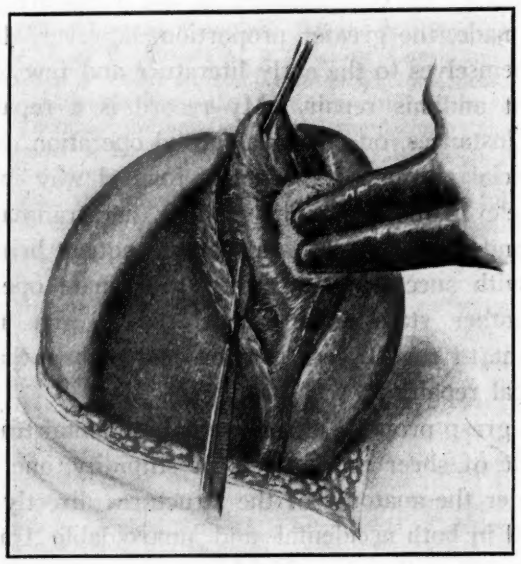

Fig. 2. Cholecystectomy. Rotating the gall-bladder on its long axis. Exposing the vascular supply and the cystic duct in the process of dissection.

is sure that neither the hepatic nor the common duct is in danger of having the ligature either transfix or surround it.

Trauma results in one of two ways, both as a rule easily diagnosticated, the one with the fistula less easily than the one without. In the first instance there is a persistent fistula discharging bile greater or less in amount. In the second variety there is no leak from the abdomen or into the abdomen, but in a short time jaundice begins.

The history of the fistula-bearing type must be carefully taken and all possible information regarding the original operation must be obtained. Fistulae, in addition to the duct trauma under consideration, follow cholecystostomy, choledochostomy and cholecystectomy. In the choledochostomies there is the drainage due to improper fixation of the fundus of the gall-bladder, as in the earlier cholecystostomies when the operator attached the gall-bladder to the skin, also occasionally when the gall-bladder was attached to the rectus muscle, fascia or peritoneum

by means of a non-absorbable material. Again, a fistula may follow where the bladder infection continues for a long time and when all stones have not been removed from the gall-bladder or when a stone has been overlooked in the common duct.

Fistulae following cholecystectomies may be due to a partial resection of the gall-bladder with or without leaving a calculus or calculi. Again, a fistula results because the ligature is somehow forced off the stump, or because a stone in the common duct

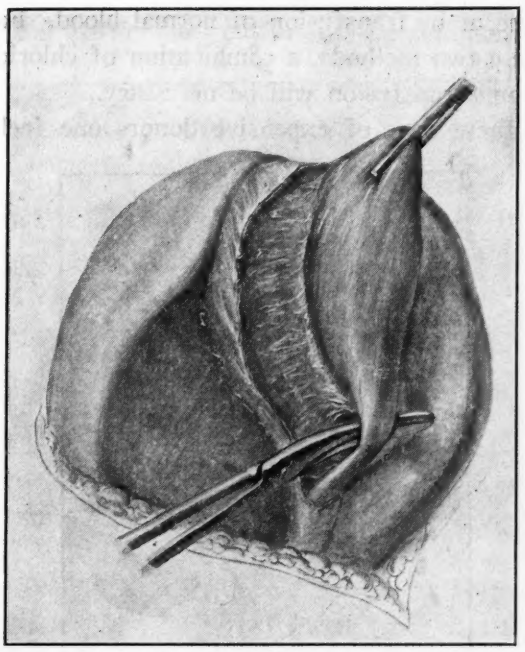

Fig. 3. Cholecystectomy. Exposure of and liberating the cystic duct from its peritoneal covering and cellular tissue.

prevents prompt healing by producing back pressure. Fistulae also may follow choledochostomy, in addition to the causes mentioned, because a stone or stones overlooked may prevent early repair. Or a cholangitis requiring drainage may not allow an early repair.

The time of repair has to be considered. Fistulae in any operation upon the gall-bladder or ducts may persist from three to twelve weeks and close without late untoward results. I am suspicious of trauma when six or eight weeks have elapsed without repair and become rather sure after the lapse of ten to twelve weeks. Nevertheless a patient with a fistula discharging a varying quantity and with his support not undermined, should receive the benefit of a watchful waiting policy.

Leakage into the peritoneal cavity, when no drain has been used after cholecystectomy has occurred in my work four times, due in each instance to a ligature slipping or to imperfect closure of the cystic duct. These patients were not greatly upset and repaired very readily as all cystic duct cases will do if not ligated but drained. One patient whom I saw with an intra-abdominal leak—she had been operated upon by a very able surgeon—had ten pints of bile removed by me on her fifteenth or sixteenth post-operative day and seven or eight days later five pints more. This patient's record will be presented in detail.

The symptoms in the fistula-bearing patients will depend on the amount of bile drainage. Several of the seven have been in a very fine condition at the

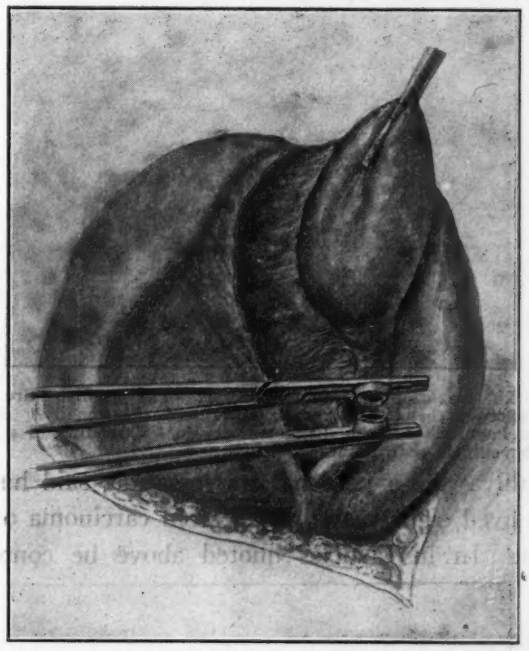

Fig. 4. Cholecystectomy. Dividing the *well exposed* cystic duct between two artery clamps.

time seen by me, one having a fistula for nine months, but discharging little, another quite prostrated at her tenth week on account of a large leakage.

The blood condition varies from a mild anemia with or without an increase of coagulation time beyond operative procedure. Considerable loss in weight and marked prostration may exist.

In the non-leaking variety (I have seen more of this variety than of the fistula-bearing) the picture is marked and readily recognized. There is a history of jaundice, and of an operation, with or without jaundice in the pre-operative period. The jaundice deepens, with no history of any intermittency or remittance, accompanied by prostration, loss in weight, pruritis and clay or putty stools. The blood picture may present a mild degree of anemia with a slight diminution in red and slight decrease in white cells; the coagulation time will be way beyond operative security, a recent one being 13 minutes by the capillary method. I refuse operation in any case where the coagulation time is over seven minutes by the capillary method until it has been brought

down. The urine, molasses to light amber in color, staining the linen yellow, will exhibit bile, albumin and casts.

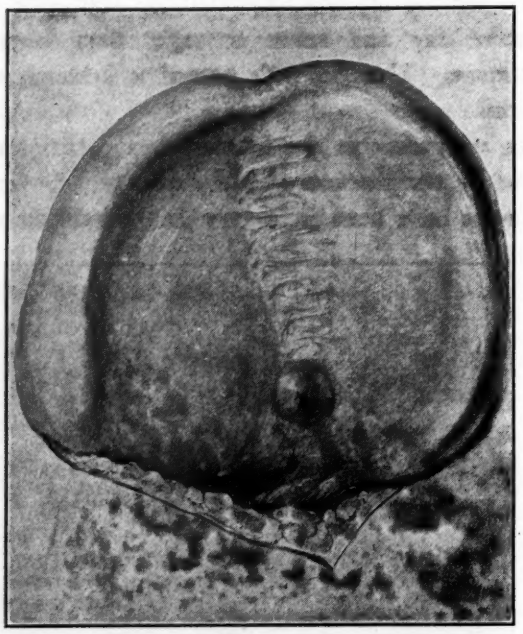

Fig. 5. Repair of the traumatized duct. The peculiar "tire blow" appearance of the closed hepatic duct, seen occasionally. It is a definite landmark for the diagnostic needle. Extending in a broad line above it is scar tissue.

Sullivan, in a personal conversation, said his patient lived eight years, dying from carcinoma of the colon. In his articles quoted above he contends,

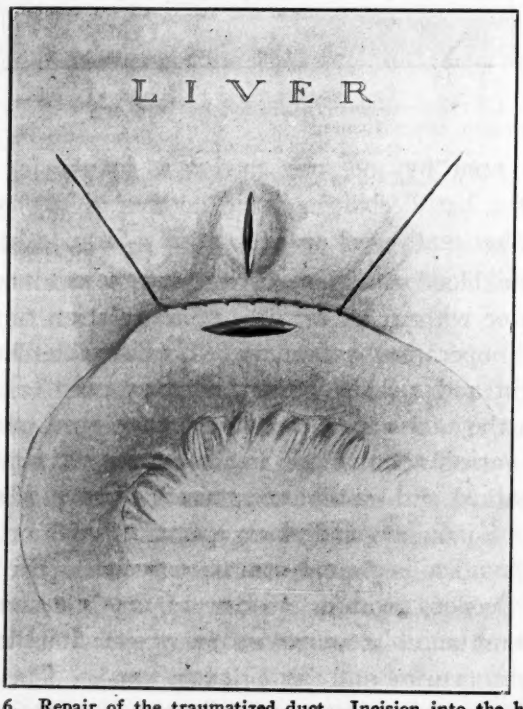

Fig. 6. Repair of the traumatized duct. Incision into the hepatic duct. Attachment of the duodenum to the liver and margin of the duct. Incision into the duodenum.

and proves, that there is a true epithelization in the duct repair cases, and that the process takes place both from above and from below. With the definite results in a clinical case and his experimental proofs in his duct reproduction work on dogs, surgeons find encouragement in attacking this grave and harrowing condition.

As a preliminary to operative treatment the dehydrated, undernourished and decalcified patient must receive special attention. The blood should be carefully studied for coagulation time. If this is over the normal, three means of improvement present themselves. The first is the introduction of lactate of lime, with such nourishing foods as can be obtained. The coagulation time may be brought within safe operable limits by the use of chloride of lime or by transfusion of normal blood. Failing in these two methods, a combination of chloride of lime and transfusion will be necessary.

In these days of expensive donors one feels in-

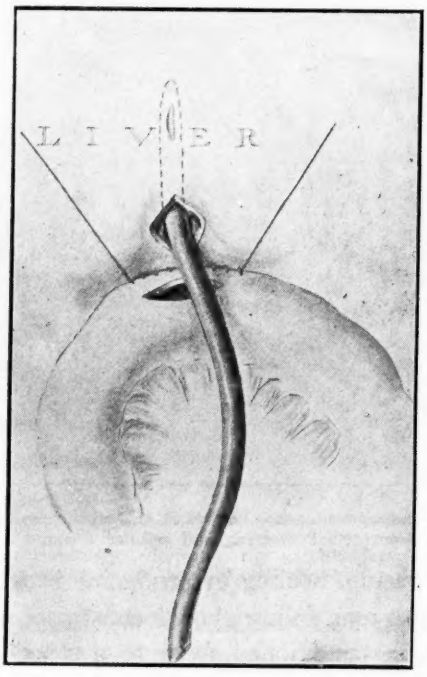

Fig. 7. Repair of the traumatized duct. Tube introduced into the hepatic duct.

debted to the authors for their experiments in the use of chloride of lime. I am using this in 10% solutions, 5-10 c.c. given daily or every other day for three or four doses, if necessary. The coagulation time is taken each day following the use of the lime. Then if the coagulation time has not come down sufficiently, the patient is transfused with 500-1000 c.c. of blood from his group donor. After the operation he is carefully observed by coagulation tests and if necessary (so far I have had no such experience) we stand ready to give more lime or blood. Recall that the preoperative condition of these patients is desperate in many instances and in all instances requires surgical help. Nevertheless, these patients when properly prepared stand their operative procedure quite well. The fistula-bearing cases, provided the flow be not excessive, can and

should be observed for a time. They may be fed the various lime salts and artificial biliary salts or ox gall.

The operative repair is a difficult procedure since the normal anatomy is thoroughly distorted on account of the adhesions one has to encounter, the depth of the tissues to be repaired and the great difficulty in finding the proximal hepatic duct in the non-fistula-bearing patient. Three times I have found it as a small excrescence, above the liver margin, like the beginning of a blowout in an automobile tire tube. The great difficulty lies in finding the distal portion or remains of the common duct.

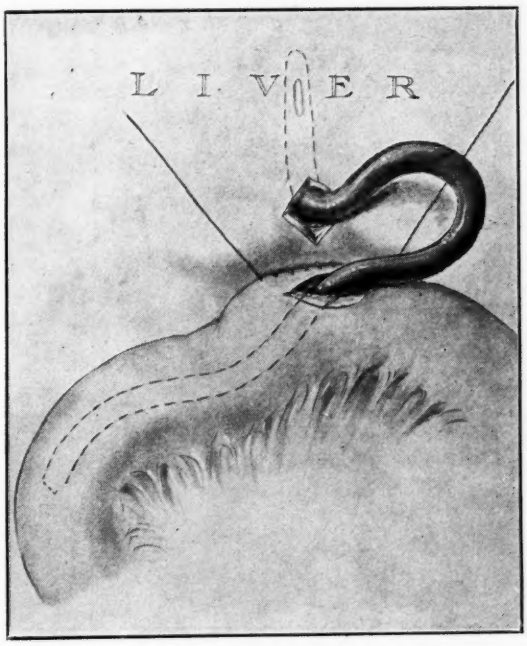

Fig. 8. Repair of the traumatized duct. Tube being introduced into the duodenum and made to follow the curve of the gut.

In three of my patients it was found. At present I do not make an extended search for the remains of the duct but proceed after a moderate search to anastomose the duodenum to the hepatic stump.

The methods of repair described in the past ten to twelve years are as numerous as the authors describing them. I do not use any special rubber tube but take the ordinary red rubber catheter of a size that will fit the hepatic duct, say with a caliber of fully ¼ inch. The caliber or lumen of the tube is the important factor, as the diameter of the catheter may be made up chiefly of rubber walls. The tube is to be placed in to remain a long time. Sullivan personally reports one in for over three years. My first case, operated upon the second time, kept her first tube in seven weeks and had her second tube in for three and one-half months. Drainage should be eliminated if possible. If not possible, the drain should be removed in forty-eight hours. None of my patients leaked more than a few hours after early removal of the drain. I am inclined to believe that the drains are prone to be harmful to repair and therefore should be removed in twenty-four to forty-eight hours. The incision in these cases may follow the original. If necessary when a longitudinal incision had been used in the original operation, a transverse incision may be added thereto, so that an incision results like a capital T on its side; or the original incision may be extended to resemble a capital L reversed. The ordinary Perthes incision will give an excellent exposure.

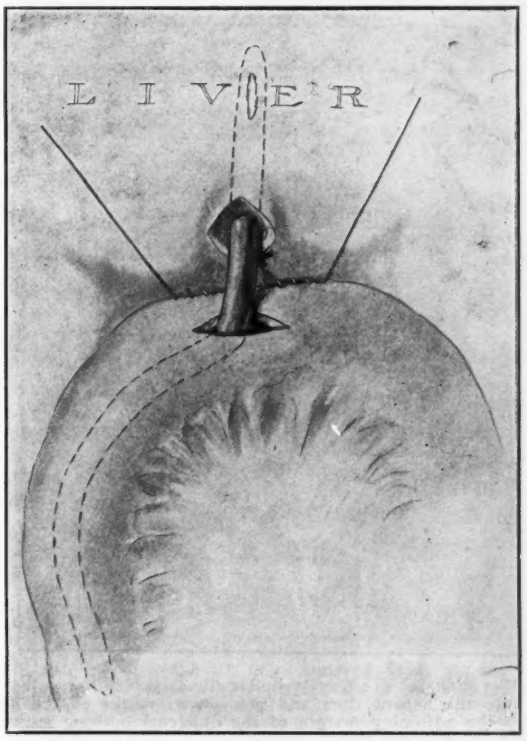

Fig. 9. Repair of the traumatized duct. Tube properly introduced into the hepatic duct and the duodenum.

Careful dissection and hemostasis with clamps and hot pads are essential. Orientation may be exceedingly difficult because of the bleeding surface, the depth, and many adhesions in addition to the fact that the anatomical and surgical landmarks are lost in cases where a cholecystectomy has been done. Careful search at the lower end of the cystic fissure may expose a small convex surface resembling tire tube "blow," or again the region may be occupied by a dense cicatrix. The use of a diagnostic aspirating syringe is of great value. Withdrawal of bile is followed by incising along the aspirating needle and divulsing the opening. In the event of a fistula, careful cleaning of the depth of the cavities, best done by the vacuum suction tip, will often reveal the opening which can then be enlarged with probe, forceps, etc. A search must then be made for the distal remains and often one finds only a mass of scar tissue resembling a cord. Several

authors advise a trans-duodenal search for the duct by passing a probe through the papilla of Vater when this can be found. It is quite easy to do a trans-duodenal search for the papilla when backed by an impacted stone but hunting for the papilla in these patients savors of the labor of Sisyphus.

Repair of the duct immediately following its injury is as a rule one simply of suture, exercising the ordinary care of edge to edge apposition. It can be done without a rubber tube, provided that in the

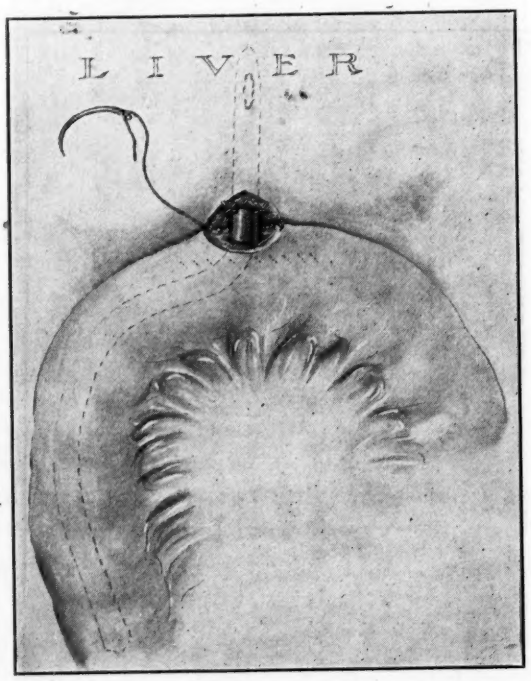

Fig. 10. Repair of the traumatized duct. Shows the tube stitched into the hepatic duct and the lower margin of the hepatic duct, with the adjoining margin of the duodenal opening sutured.

trauma no great amount, say not over one-half an inch, is destroyed or excised.

Having located the hepatic and common duct when possible, if there has been no great destruction one sews the ends together or, in the cases where a greater amount of the duct has been destroyed, one introduces the catheter or tube and repairs over it by bringing the edges as near together as possible.

My first patient, who after eleven months required a second operation, was one of the latter varieties. I closed over the gap in the duct with the duodenum and some omental flap after sewing the catheter in with chromicized gut. I believe, in view of Sullivan's work, that my tube passed too soon. All my subsequent operations, seven in number, were done in the following way:

The proximal end being found, the tube or catheter is introduced one to two inches into the liver and sewed in with one or two chromicized catgut sutures, grasping the tissues of the duct and the capsule of Glisson in the needle bite. The protruding catheter or tube is cut off so that six to eight inches remain exposed. The duodenum, in the instances when the distal duct is not found, is then attached below the hepatic duct fully one-quarter of an inch to the peritoneum covering the liver (capsule of Glisson) with two to four sutures closely placed. A flap is cut, in character like that in a gastro-enterostomy. An opening is made through the muscular and mucous coats large enough to

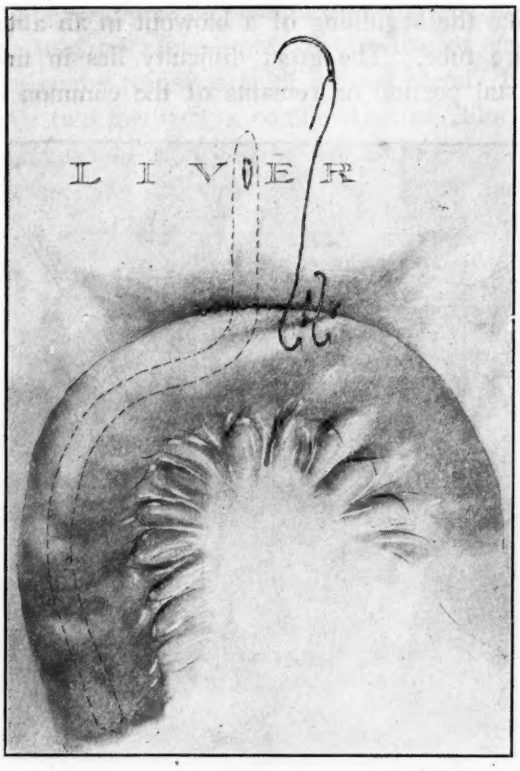

Fig. 11. Repair of the traumatized duct. The upper margin of the hepatic opening sutured to the distal margin of the duodenal opening. The final row of sutures begun.

admit the tube which, by means of its six to eight inches of length, is passed around into the transverse portion of the duodenum, so that the tube has no kink at its entrance into the liver and gut. The musculo-mucous posterior area is sewed to the edge of the hepatic opening, and the anterior to the upper edge of the hepatic opening. Finally the peritoneum of the duodenum is sewed to the liver above the tube. (See figures 5-12.) The well is wiped dry, a rubber tissue drain is placed in, and the abdominal wall is sutured. The subsequent care is early removal of the drain, etc.

CASE RECORDS.

These case records are of seven patients with eight repairs and one reopening for plugging of tube.

CASES I AND II. Mrs. Y., 34. Positive history of cholecystitis. Was operated upon June 14, 1917, in a neighboring state,—a cholecystectomy—for many stones, and an appendicectomy. October 25, 1917, fistula persisted; reoperated upon by another surgeon in the same state. Evidently nothing done on account of excessive oozing. There were two scars in the right upper quadrant of the abdomen, within two inches of each other, and bile discharging. Usual weight 116

pounds, now 90 pounds. This is the patient who successfully sued her operator.

December 3, 1917, Operation: Repair of the common duct by introducing a rubber tube, through the remains of the common duct into the duodenum and upper end of the tube into the hepaticus, building a new duct in the gap by surrounding the tube with duodenum and omentum. Tube discharged at the end of four weeks and six days. By January 17, 1918, the patient had gained 16 pounds. She had normal stools in August. November 14, 1918, had some chills and varying attacks of jaundice of eight to ten days duration. From that time on she began to lose weight and became permanently jaundiced. By December 9, 1918, she was deeply jaundiced and weighed but 79 pounds.

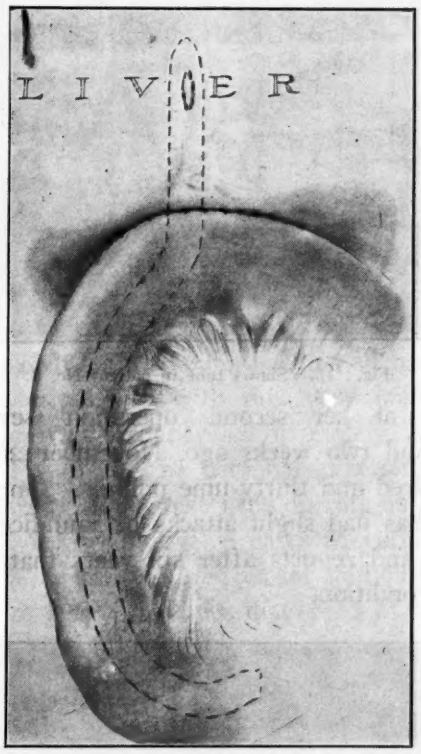

Fig 12. Repair of the traumatized duct. Completed operation.

December 9, 1918, Operation: Repair, as described, by joining the duodenum to the hepatic duct flush with the liver and also attaching the duodenum to the liver. The second tube was passed practically four months after the operation. This patient was seen by me on November 6, 1923, and is in excellent condition, weighing 139 pounds.

CASE III. T. Female, 55. Cholecystectomy for cholecystitis in this city, April 30, 1918. Nine days later, hemorrhage. Drained for eight months and had pain. Reoperation for adhesions left a biliary and mucous fistula. Loss of weight 50 pounds. May 8, 1919, seen by me. Slight mucous discharge, very thoroughly jaundiced — mahogany color. May 21, 1919, Operation: Blood coagulation 13 minutes by capillary method. After several transfusions, 2500 c.c. in all, a hepatico-duodenostomy was done. Death from pneumonia in three or four days.

CASE IV. S. Female, 39, November 30, 1917. First saw her one year before in consultation with her family doctor about five or six weeks after operation in this city, at which time she had jaundice, said to have been present almost from the day of her arising from her bed after operation. This jaundice would disappear and return occasionally, but was very light. Became pregnant and aborted during an attack of jaundice. Had lost 53 pounds, although had also been dieting. Repair of duct advised. December 28, 1917, Operation: hepatico-duodenostomy. November 19, 1923, seen in my office in excellent condition.

CASE V. X. Female, 32. November 20, 1917. Cholecystectomy and appendicectomy done by me. Numerous stones, and unusually easy operation. Injury to common duct due to spiral implantation. (I was doing my ten hundredth gall-bladder operation and should have had no such injury.) Injury recognized and distal end readily found—inability to find the proximal end evidently because of its retraction beyond the hepatic surface. Examination of specimen removed was not indicative, no two holes or tubes being found. Abdomen was sutured with the feeling on my part that an anomaly existed and that a deeper duct was present. No jaundice (no abnormal irritation) for nine days. This period of itself strengthened my belief that I had not injured the true duct. Jaundice appeared on the ninth day. The patient and family refused reopening of abdomen and insisted on the patient's leaving the hospital. On June 12, 1918, she returned to the hospital deeply jaundiced. Hepatico-duodenostomy was then done. Died in two days, evidently from shock.

CASE VI. V. Male. Seen in an adjoining state, after a cholecystectomy. No fistula, badly nourished, much jaundiced. Operation revealed a distinct eminence at the hepatic fissure and an immensely enlarged liver. Diagnostic needle revealed bile. The scar tissue was incised and the opening into the hepatic duct divulsed. This was followed by a free evacuation of fully a pint and a half of bile. The immensely engorged liver rapidly returned to normal size while the operation was going on. Same type of repair was made. I have been told that this patient has been operated upon twice since, but cannot verify the report.

Fig. 13. Photograph of tube removed from patient in Case 8. Note the material extruding from the distal end and the crystal deposit on the proximal (hepatic) end.

CASE VII. Mrs. S. About 28. Cholecystectomy in a neighboring state; no drain. Through a second incision some uterine work was also done, it was reported. Seen by me at her home on the fifteenth day, her abdomen distended to the size of a "ten months" pregnancy, dull on percussion; two scars on abdomen; emaciated; no jaundice; a catheter in the superficial structure of a suprapubic wound, but no drainage beyond a yellow stain on the gauze. Examination showed that the catheter had not entered the peritoneal cavity. I used my finger and broke into the peritoneal cavity. Fully ten pints of bile then escaped through this opening. Two days later she was sent to me at the Post-Graduate Hospital, November 23, 1921, and six days later the abdomen was reopened through the original gall-bladder wound. Eighty measured ounces of bile were collected besides a certain amount of spillage. A drain was placed down to the bottom of the biliary wound and in the course of a few days the flow of bile ceased. She was discharged from the hospital early in 1922 and returned about September 21, 1922, for pronounced jaundice with exaggerated pruritis and loss of weight. Operative repair:

hepatico duodenostomy. Tube in as late as August, 1923. In November, 1923, patient in good condition, normal weight.

CASE VIII. Mrs. T. May, 1923, came into my office profoundly jaundiced, emaciated, in fearful mental and physical state and with numerous scratches and abrasions all over her body. She had had an operation in a suburban hospital eleven months before, followed one month later by

Fig. 14. Shows tube in patient Nos. 1 and 2.

pruritis and jaundice. June 7, 1923, Operation: hepatico-duodenostomy. Rapid convalescence and early gain in weight. Returned to the hospital October 15th, for mild jaundice. Observed six days and improvement being marked was allowed to return home. November 10, 1923, returned again with jaundice more marked, abrasions and scratch marks, loss in weight, and some pain over her liver which was greatly enlarged. Roentgenograms showed her tube in its original position. Feeling that the tube had be-

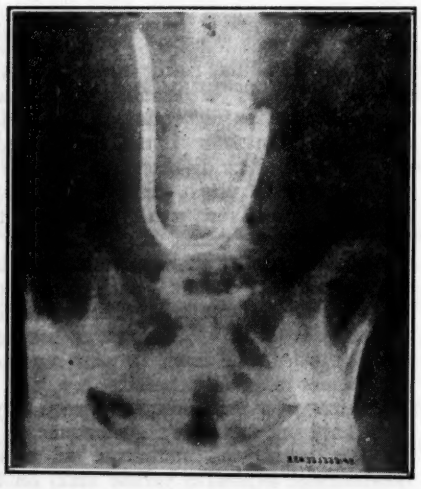

Fig. 15. Shows tube in patient No. 7.

come clogged, I reopened her abdomen on November 23rd and found that the tube was well in place. On removal, which was readily accomplished, the hepatic end was found covered with crystals presenting a picture similar to that of a catheter left in the urinary bladder. On compressing the tube in its continuity, I was able to expel a material of fibrous character and consistence and of the color of a cream paste. Upon removal of the tube there was a gush of mixed bile and pus from the liver in such quantity that a rapid diminution in the size of the liver was observed. Although the duct opening felt smooth and soft I deemed it advisable to place another but shorter tube in. This was done, the patient making a speedy reaction from the operation.

One of my patients required a second operation after eleven months. This was the patient in whom I reconstructed the duct and since doing the operation as described above, she has gone five years,

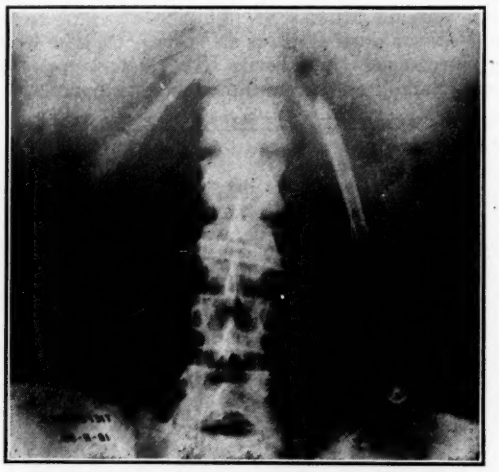

Fig. 16. Shows tube in patient No. 8.

weighing at her second operation seventy-nine pounds and two weeks ago, November 20th, 1923, one hundred and thirty-nine pounds. One of these patients has had slight attacks of jaundice of short duration and reports after six years that she is in "bully" condition.

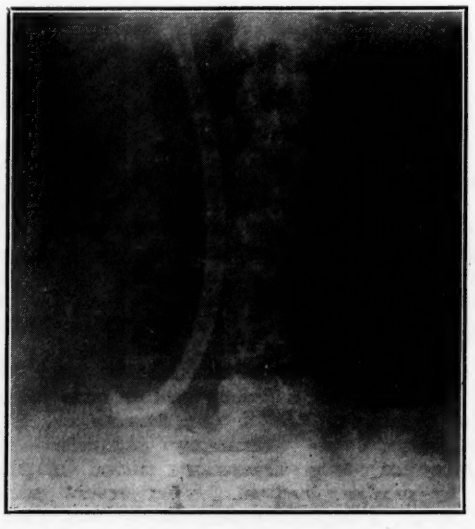

Fig. 17. Shows tube in patient No. 8 after removal of original tube.

A second and more recent patient with her tube in situ as shown by x-ray pictures recently began to develop jaundice. This was due to a plugging of the tube with mucus or salts, for subsequently the jaundice disappeared. Seen again later and reported in detail (Case No. 8).

Following the operation there is a rapid loss of jaundice, a marked rapid mental change and a very pronounced gain in weight. The recurrences must be

ascribed to contracture of the newly formed canal following the passing of the tube before proper epithelization takes place. Therefore all attempts at fixation of the tube should be made, contrary to the early feeling that some material should be attached to the distal end of the tube to promote its removal by peristalsis. The great difficulty is that peristalsis will pull and push the tube without any accessory. That the tube may become plugged and obstruct the flow of bile must be considered and this requires removal with or without reintroduction of another. (See late history of Case 8.)

60 WEST 52ND STREET.

CARCINOMA OF THE GALL-BLADDER.*

JOHN B. DEAVER, M.D., F.A.C.S.,
PHILADELPHIA

It is with no little hesitancy that I chose to discuss carcinoma of the gall-bladder on this occasion, inasmuch as your own Dr. Erdmann has had such an unusually large experience with this very malignant form of visceral malignancy. Fortunately, or unfortunately, if you will, my personal experience has not been so large. In my last 1128 operations on the gall-bladder I have had twelve cases of carcinoma, making 1.07%, that is to say, either pathologically proven cases or inoperable ones diagnosed at laparotomy. But in view of the high figures presented by Dr. Erdmann and the hopeless prognosis which the condition presents I thought it well to bring it to your attention once more.

The cause of cancer of the gall-bladder remains as obscure as the cause of malignancy in general, and as in the latter so in the former, the efforts of the profession are engaged in endeavoring to determine certain conditions that may be said to be forerunners of cancer, and thus by early recognition and treatment of these, to endeavor to limit the increase of cancer incidence. Our experience with cancer of the gall-bladder corresponds in one general respect with other cancerous diseases, particularly gastric cancer, in that the cases fall into two separate groups. The first is of those in which the history is a prolonged one and in which the cancer develops as the result of continued irritation of an inflammatory condition. Nowhere is this more marked than in cancer of the gall-bladder, in which the prolonged presence of gall stones represents the irritating agent. On the other hand, there is the other group in which the disease apparently develops without any premonitory symptoms whatever, and which leads some authorities strongly to doubt the relationship between carcinoma and cholelithiasis. A striking instance of the former was recently under my care in the Lankenau Hospital.

The patient, a woman aged 47 years, the mother of four grown children, gave a history of normal health, without any unusual digestive troubles, until about three months before admission, when she developed signs of failing strength—loss of appetite, loss of weight, and digestive discomfort, consisting mainly of fullness after meals, belching gas, progressively increasing pain in the right hypochondriac region, sometimes radiating to the back and between the shoulder blades. I was called in consultation shortly after the onset of the trouble, and found a hard mass in the region of the gall-bladder. This, together with the patient's general appearance led me to make a diagnosis of carcinoma of the gall-bladder. The woman was at that time also suffering from a chest condition which precluded operation. Several weeks later she was brought to the hospital with fever, very definite and exquisite tenderness over the mass, which, if it had not been seen before could readily have been considered that of acute cholecystitis. At operation a huge inoperable carcinoma of the gall-bladder was found adherent to the structures normally in relation with the viscus, and with metastasis to the overlying part of the liver. For several days the patient ran a temperature varying between the normal and 101°, with pulse between 96 and 120. There was now exquisite tenderness over the mass, which, with the fever and a leucocytosis of 12,000 led me to diagnose most probably a pericholecystic suppuration complicating the carcinoma. Operation revealed this condition with pus and many stones in the cancerous gall-bladder in addition to pus outside of the gall-bladder. The gall-bladder was emptied and drained, and drainage was also instituted of the pus cavity outside of the viscus. Pieces of the gall-bladder, and of the liver at the site of the metastasis, removed for examination, showed carcinoma. The patient recovered from the operation and was able to go home in four weeks.

I may remark incidentally that I have seen suppuration a number of times in connection with malignant neoplasms. I am prompted to make this statement for I have on occasions met with opposition in consultations where I have declared myself against the prevailing opinion that the suppuration was due to a primary non-malignant infection. As another illustration, suppuration is seen associated with an ulcerating carcinoma of the cecum, diagnosed suppurative appendicitis, where I have stood alone in opposing immediate operation for the latter condition.

Although the above patient has for the present been relieved of pain, and made a good operative recovery, the prognosis, of course, is hopeless. To be sure, there is no reason why carcinoma should not develop spontaneously in the gall-bladder but, with many authorities, I feel that if it were possible to get a good history in most of the cases there would be some item to suggest the presence of some irritating factor, and also if it were possible to make an early pathological examination of such gall-bladders the source of irritation giving rise to the malignancy would be found, such as the stones in the cited case. Since these rapidly fulminating cases are nearly always inoperable, we are not always able at laparotomy to make a thorough examination to ascertain, if

*Read before the Society of the Alumni of Bellevue Hospital, New York City, March 5, 1924.

possible, the basis of the malignant degeneration.

The first group of cases, however, represents the larger one and is more readily explained. Statistics vary as to the proportion of cases of carcinoma of the gall-bladder associated with a history suggestive of gall stones. In my experience the proportion is about 87%. General statistics give an incidence of about 82% of cases of primary and about 15% of secondary cancer of the gall-bladder associated with gall stones. McGlinn, in post mortem studies, found stones in eight out of eleven cases of primary cancer of the gall-bladder and three out of five of primary cancer of the bile ducts. The fact that gall stones are so often found post-mortem in subjects who have no history of gall-bladder disease is often used as an argument in favor of innocent gall stones. But in these same post-mortem studies McGlinn shows that of 506 cases presenting gall stones only 21 had been diagnosed, but that 289 or 57% showed lesions of the gall-bladder or the bile passages dependent on gall stones. These findings have been confirmed by many authorities, notably William J. Mayo, who long ago found innocent gall stones to be a myth. It is for this reason that every effort should be made to enhance the diagnosis of gall stones, and in view of the fact that cancerous transplantation may be the result of their presence in every individual with a gall stone history who gives evidence of persistent loss of weight together with functional derangement, such as digestive disturbances and pain referable to the region of the gall-bladder there should be aroused the suspicion of cancer.

Like other malignant disease within the abdomen the diagnosis of early carcinoma of the gall-bladder is not easily made clinically. The symptoms may vary from a mild gastric catarrh to a severe cholecystitis. A neoplasm situated in the fundus of the gall-bladder will remain symptomless and may even perforate the wall and attack the serosa, without necessarily arousing the suspicion of malignancy. In the neck of the gall-bladder, however, it is not so apt to remain quiescent, but even here, the absence of stones in the cystic duct, and the presence of sterile bile, may mask the serious condition. The combination, however, is rare, and occlusion of the cystic duct leads to severe cholecystitis; but a clinical diagnosis of malignancy is not made unless there is cachexia and a palpable mass. This applies to the early stage of the disease. From this we see that the onset is insidious and owing to the fact that the malignant neoplasm usually develops in the fundus obstructive symptoms are delayed; and we all know that painful cancer means hopeless cancer.

The disease usually affects the female with a history of gall stones but without any definite indications at first of cancer. The general signs later on are progressive loss of weight and the functional signs are digestive disturbance and persistent dull pain in the right hypochondrium. It is the persistence of the pain that distinguishes it from cholelithiasis, which is characterized by paroxysms of colicky pain that usually yield, temporarily at last, to treatment. Although acute exacerbations of pain do occur in cancer of the gall-bladder, there never is complete relief as in cholelithiasis.

The digestive disturbances are not very pronounced at first, consisting of anorexia, retarded digestion, occasionally nausea and vomiting of food and bile, attacks of diarrhea alternating with habitual constipation. At this point physical examination will reveal only some muscular rigidity in the right upper abdominal quadrant, aggravated by deep pressure and deep inhalation by the patient. But as the symptoms, particularly the loss of weight, progress, the suspicion of maligancy will be confirmed by the presence of a hard mass, slightly movable with respiration. The tumor may be either pyriform or rounded, smooth or nodular, and is varying in size. It usually is painful to pressure, and dull on percussion, the dullness reaching to the liver. It is rarely visible on gross inspection.

The growth usually originates in the fundus of the gall-bladder so that jaundice is apt to be a late symptom. When it appears, it is progressive. There is, however, a certain type in which the jaundice is intermittent. This takes place when ulceration of secondary tumors in the bile passages permits partial passage of bile. The variation in the jaundice, however, will probably be limited to the changes in the color of the stools, while the skin and ulcers remain unchanged. French authors, particularly Pollet, designate this as the biliary type of the disease. He also distinguishes an hepatic type and a ganglionic type. In the former, hepatic involvement is manifested by a massive, dull, hard hepatic tumor, increased liver dullness and digestive disturbances, accompanied by signs of hepatic insufficiency together with rapid cachexia. In the ganglionic type the picture resembles that of a nodular cancer of the liver; nodules will also be palpable in the epigastric region, not movable to the touch but moving with respiration and continuous with the liver dullness. The combination of these nodules together with the other clinical manifestations will leave little doubt as to the diagnosis of malignancy, but will probably suggest cancer of the liver, secondary to cancer of some organ in the digestive tract.

Sometimes symptoms of obstruction may call for differentation of "lithiasis carcinoma" and cancer of the pancreas. As we have seen, in the former the jaundice may be intermittent, and is usually accompanied by pain. Physical examination shows the typical tenderness over the site of the gall-bladder and some enlargement and tenderness over the hepatic region. The stools are acholic and the urine is dark. Cancer of the pancreas differs from that of the gall-bladder in that it shows a preference for the male sex, and develops without any antecedent history relative to gall stones. There is usually a vague period of upper abdominal symptoms that show no definite localization. Jaundice appears sooner or later and is painless and progressive; the gall-bladder enlarges and there is rapid loss of weight and strength. Bile and pancreatic juice are persistently absent from the duodenum, indicating complete obstruction. A tumor connected with the pancreas can rarely be recognized; when present, however, its relations can sometimes be determined by inflating the stomach and colon. The size of the liver is not of much importance in differential diagnosis. The clinical picture as briefly outlined indicates complete obstruction of the common duct, the most frequent cause of which is carcinoma of the head of the pancreas. Of course, as in all diseases, atypical cases of cancer of the pancreas occur, and it is these that add to the difficulties of differential diagnosis. In some instances it develops after a history of gall stones, or after gastric or duodenal disease; sometimes obstruction of the common duct is absent; and occasionally there is a palpable, movable tumor. These cases are almost impossible to diagnose clinically.

It must be remembered also that cholelithiasis is frequently associated with chronic pancreatitis and may suggest carcinoma of the pancreas. But the absence of cachexia and the presence of edema usually lead to a tentative diagnosis of carcinoma.

Pathologically, the specimens studied at the Lankenau Hospital are mostly of the type we call carcinoma simplex, that is, grossly they are hard, almost cartilaginous, and histologically they are composed of small, more or less undifferentiated spheroidal cells growing in groups into dense connective tissue with no attempt at differentiation into any typical gland-like structure. Some of the specimens are of the adenocarcinoma type, that is, are composed of cylindric mucus-producing epithelial cells arranged in a more or less typical glandular form; occasionally we see a cancer of the squamous epithelial type.

Carcinoma of the gall-bladder rarely, if ever, metastasises to remote portions of the body, but in its progress it attacks neighboring organs secondarily, principally by lymphatic extension. Although the growths are usually circumscribed at first, infiltration becomes marked, resulting in nodular enlargement of the gall-bladder. When obstruction of the cystic duct takes place, the gall-bladder usually becomes distended, and the contents often are bloody. Perforation into the general peritoneal cavity is rare, but adhesions to the duodenum, pylorus or colon are common; and ulceration into the colon, stomach or duodenum may take place and lead to the formation of an internal biliary fistula.

The picture of carcinoma of the gall-bladder is not a bright one. As I have remarked on a previous occasion, if carcinoma provides the darkest chapter in our medical annals, carcinoma of the gall-bladder provides some of the darkest pages of that chapter. Diagnosis in its early stage, even by *x*-ray examination, is not always possible, and in its late stage it is best accomplished by exploration. But the cases that come to operation are nearly always already hopeless. From our follow-up records we find that the expectancy of life averages about nine weeks after operation, that is to say from one to six months. Courvoisier estimates an average of three months after the first indication of malignancy, such as the cachexia and perhaps jaundice.

If then, as most authorities believe, gall stones are exciting factors in the development of cancer, it would seem that here we are fortunately dealing with a demonstrable pre-cancerous disease which can be effectively eradicated by the removal of the benign disorder known as cholelithiasis. Cancerous transformation of a gastric ulcer is no longer doubted in many quarters. The evolutionary process of gall stones is an analogous one, since it is the presence of the stones that leads to possible necrosis and prolonged ulceration, with consequent epithelial proliferation and cancerous changes. Therefore the possibility of cancer as a sequel of gall stones must form a part of the prognosis of calculous cholecystitis and must enter into consideration in deciding for or against operation.

EARLY CANCER SYMPTOMS.

The general practitioner should be at all times keenly alive to the possibilities which apparently insignificant symptoms may hold out. This does not mean that we must all become alarmists, but it does mean that a frightened patient is far better than a dead or dying one, and when there is any doubt the physician has no right to "take a chance."—C. J. BROEMAN in the *New York Medical Journal and Medical Record.*

SOME SURGICAL PROBLEMS OF CARDIOLOGY. TECHNIC OF MITRALOTOMY.

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Disheartened by the distressing nature, the progressive character, and the frequent inefficacy of the medical treatment of certain cardiac lesions, enterprising workers have from time to time endeavored to develop a surgical aspect to the treatment of heart disease, their prevailing idea being not to supplant medical treatment by surgery but to introduce the latter in a more radical attempt to relieve pain or prolong life.

With this object in view a surgical treatment of hyperthyroidism was developed, a definitely preventative policy being in this instance established, since in those cases that fail to be sufficiently influenced by medical treatment, extirpation of part of the over-active thyroid gland reduces or abolishes the thyrotoxicosis, and similarly the degenerative changes that develop in the heart musculature as a result of exposure thereto.

With the object of relieving pain, the operations of neurotomy and neurectomy have long been carried out, e. g., excision of a portion of one or both lingual nerves has been undertaken for certain cases of inoperable carcinoma of the tongue. In January, 1913, Sir Alfred Pearce Gould performed section of certain lower cervical and upper dorsal posterior roots to relieve the pain of recurrent carcinoma after amputation of the breast. It is not only for the relief of the pain of malignant disease, however, that nerve section has been advocated: Hey Groves, Forster and many others have performed the operation for the relief of the gastric crises of tabes, the pain of neuralgia and neuritis, and for the abolition of spasticity in such conditions as spastic paraplegia.

Discussing the physiology of the posterior roots in the light of such procedures, Professor Earl and one of the writers, in a paper published in 1913, considered the possibility of applying posterior root section for the relief of the pain of angina pectoris, stating "In the case of referred visceral pain the operation should prove a good one, and one would tentatively suggest its performance for the relief of angina pectoris."

This suggestion was put into effect later in the same year when, in conjunction with Sampson Handley, posterior rhizotomy of the 2nd, 3rd and 4th left dorsal spinal nerves was carried out in the cadaver. It was found however that a simpler and probably equally as effective procedure was to inject alcohol or novocain into these roots.*

It was about this time that one of the writers was working at the possibility of introducing surgery for the relief of mitral obstruction.

The tragic death of the young sufferer from mitral stenosis, whose systemic circulation is starved of oxygenated blood because of the obstruction at the mitral valve, is well known. "Desperate diseases need desperate remedies," and desperate though an attempt at relieving the obstruction by surgical means may seem, it would appear that in the hands of an operator who has developed and sufficiently practiced an efficient technic, the operation may afford a ray of hope for the future.

It has been well said that in order to decide upon the justification for operating, a surgeon should endeavor to put himself in his patient's place and imagine the operation applied to himself. With death imminent from mitral obstruction who of us would not clamor for something to be done, could we but place our faith in an operator and a technic sufficiently sound to give at least a chance of life?

It should be obvious in the first place that so highly a specialized technic as is required for any intracardiac operative procedure can be carried out only by the specialist who has devoted much time and patience to perfecting his methods of operating upon the heart, and however expert an operator a general surgeon may be, he would be quite unjustified in attempting such an operation without first developing this technic by experimenting upon the cadaver and upon animals.

In pure mitral stenosis one is confronted with a lesion which is almost entirely a local one, but which is only too frequently of a progressive character and which will ultimately cause the death of the patient by obstructing the auriculoventricular opening.

The whole object of any operation in mitral

*Danielopolu of Bucarest has recently published two papers on the injection of novocain or cutting of the left segmental nerves concerned with the transmission of the pain impulses of angina.

stenosis must be to supply the left ventricle with oxygenated blood.

As the obstruction increases, the input becomes less and less, the left ventricle becomes small and atrophic, the left auricle large and hypertrophic, the compensatory development of the latter to a certain extent helping to overcome the resistance at the mitral ring. The diminution of input to the ventricle results in diminution of output, and since the ventricular fibers are not fully stretched the force of systole is diminished and the blood pressure is low.

Approaching failure in mitral stenosis is indicated by signs which are produced by the increase of the obstruction at the mitral valve; this may be absolute and depend upon further

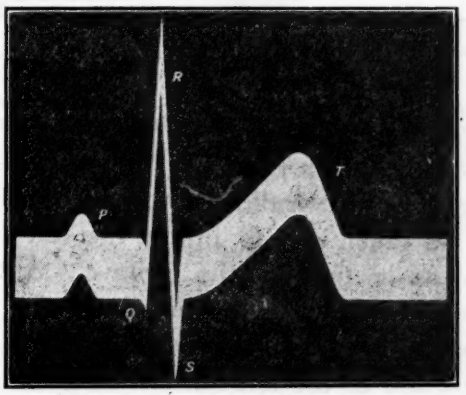

Figure 1. Normal Electrocardiogram. *Lead 2* (Average of a number of curves taken from healthy students). Contractions of auricles, right ventricle, left ventricle, apex and base, represented by *P, Q, R, S, T,* respectively. The space *P—R* represents the time taken for the wave of contraction to traverse the auriculo-ventricular bundle of His.

cicatrization definitely diminishing the orifice, or relative, and depend upon lack of sufficient *vis a tergo* in the left auricle to drive its contents through the existing opening.

The deficiency of the left ventricular input is indicated electrocardiographically by an absence or reduction of *T* waves in lead 2. (Compare figures 1. and 2.)

The onset of auricular fibrillation which is coincident with disappearance of the presystolic bruit, is conspicuous by the absence of *P* waves in the electrocardiogram.

The output of the left ventricle becoming less and less, the pulse becomes smaller and smaller in volume.

The impaired force of the contraction, due as we have previously stated to the incomplete filling, failing to stretch the muscle fibers of the ventricle, manifests itself not only by a lowered blood pressure but also by an apex beat slapping in character, and a pulse weak in force.

These signs of failing output, along with the general signs of cardiac failure, are indicative of insufficiency of blood in the left ventricle.

Theoretically this deficiency may be met by (1) either connecting the auricle and ventricle by an extracardiac channel, e. g., by using a sleeve of pericardium, or, (2) by an intracardiac operative procedure which has as an object enlargement of the existing orifice.

The intracardiac operation may be carried out (1) through the ventricle as was recently done in America, or, (2) through the auricle.

At first sight the ventricular route appears to offer certain advantages:—

(1) The left ventricle is more superficial and more easily exposed than the deeply placed auricle.

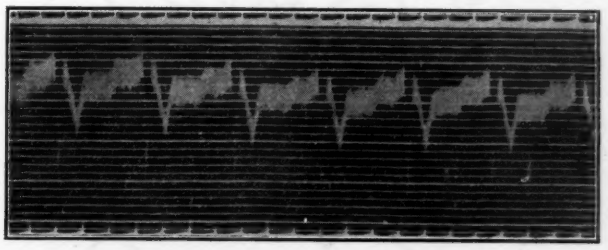

Figure 2. Electrocardiographical representation of failing mitral stenosis. The ventricle is not filled in diastole because of the mitral obstruction. Its fibers are but partially stretched, the *T* wave in consequence is absent. (See text.)

(2) Owing to the presence of the incisura cardiaca the pleural cavity can be altogether avoided and danger of wounding the pleura is comparatively slight.

(3) The thick muscular wall of the ventricle is easily sutured, its thickness rendering the possibility of passing sutures through the endocardium unlikely, and also by reason of its thickness, hemostasis is the more easily obtained.

(4) When operating from the ventricle there is less liklihood of disturbing clots in the auricle than by handling the latter.

(5) The ventricle contains very little blood until the valve is incised.

Certain disadvantages are, however, conspicuous. Because of these we would criticize the ventricular route and, although technically a more difficult procedure, advocate instead the auricular approach.

(1) When the stenosis is extreme and particularly when of the "funnel type" as opposed to Corrigan's "button hole" variety, it is exceedingly difficult to introduce even a probe through the mitral orifice from the ventricle. This difficulty does not occur when the auricle is used, because the funnel directs the probe towards

the valve orifice which represents its truncated apex.

(2) An instrument passed from the ventricle through the mitral opening into the auricle is more likely to injure the latter than it is to injure the ventricle if passed in the opposite direction.

(3) Injury to a hollow viscus tends to paralyze it and so enhance its recovery; this is seen for instance in the case of the intestine or bladder. The only chambers of the heart that more

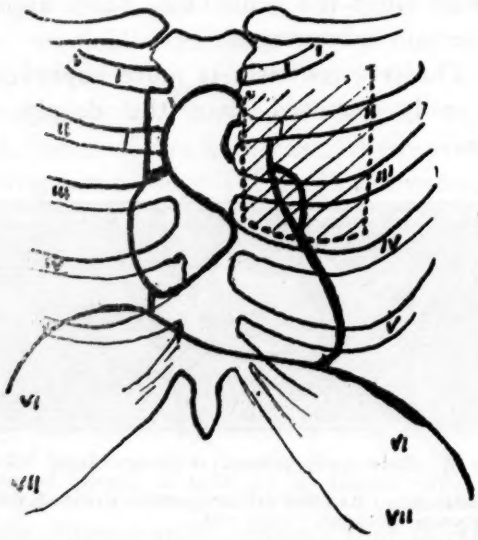

Figure 3. Diagram of bony relations of heart showing the position of the osteoplastic flap used by the writers. The flap, which contains the sternal ends of the second and third ribs, includes also the internal mammal artery and is turned upwards over the first rib.

than momentarily can be paralyzed or thrown into fibrillation without causing the death of the individual are the auricles.

(4) The systolic blood pressure in the left ventricle is the highest in the body, and it is doubtful whether this fact does not outweigh the advantage of its thick muscular walls in securing hemostasis, especially when we remember also that in mitral stenosis the auricular wall is hypertrophied.

(5) Sutures tend to cause subsequent degeneration of the musculature with perhaps dilatation or rupture. An area of degeneration in the ventricle is of more significance than one in the auricle would be.

Moreover, the disadvantages of the auricular route are not so great as they might appear:—

(1) The auricle can be exposed and identified in a way indicated later.

(2) The dilated and hypertrophied left auricle of mitral stenosis is more easily dealt with than the normal auricle.

(3) As previously mentioned, an instrument can more easily be passed into the mitral valve from the auricle than from the ventricle.

(4) Owing to the more intimate relationship of the pericardium to the auricle than to the ventricle this membrane may be used for repairing the wound in the auricle, and this may be done without fear of subsequently embarrassing the heart action.

In order to incise the matted and indurated valve flaps, by no means an easy procedure when these are as hard as cartilage as some prove to be, the authors have designed a double edged knife (figure 4.) which can be plunged through the auricular wall in a plane parallel to the coronal; the point is introduced through the mitral opening and the valve mass slit towards the

Figure 4. Mitralotomy knife designed by writers, with double-edged, tapering blade. (Model made by D. H. Bailey & Sons.)

septum and again towards the auriculo-ventricular groove. In making the latter incision care must be taken not to injure the left coronary artery as it lies in the groove. A threaded suture placed round the handle of the knife is drawn tight as the blade is withdrawn.

Exposure of the left auricle, as previously indicated, is not difficult in mitral stenosis where the cavity is ballooned out at the expense of a withered ventricle. On a number of occasions the writers have performed the operation upon the cadaver through an osteoplastic flap, as shown in figure 3, containing the sternal ends of the second and third ribs, and they are also investigating other routes.

If in the course of the operation the pleura is opened pneumothorax and collapse of lung may seriously embarrass the patient. Artificial respiration and the intratracheal method of administering anesthesia may be employed with advantage.

When the pericardium is exposed it is important to know where to open it, and how to identify the left auricle. The latter is not always an easy matter as part of the right ventricle, particularly if fatty, looks very much like auricle and may be mistaken for it.

If, however, a longitudinal incision is made between the vagus and phrenic nerves (figure 5.) just posterior to the latter and below the superior intercostal vein, which will be found running upwards and inwards between these

nerves, the left auricular appendix will be seen lying at the bottom of the wound with its tip curled round the root of the pulmonary artery. By gently drawing the tip forwards the body of the auricle can be exposed.

At this stage it is proposed to conclude this short sketch, but it would be amiss to do so without briefly touching upon the work of some others on the same subject.

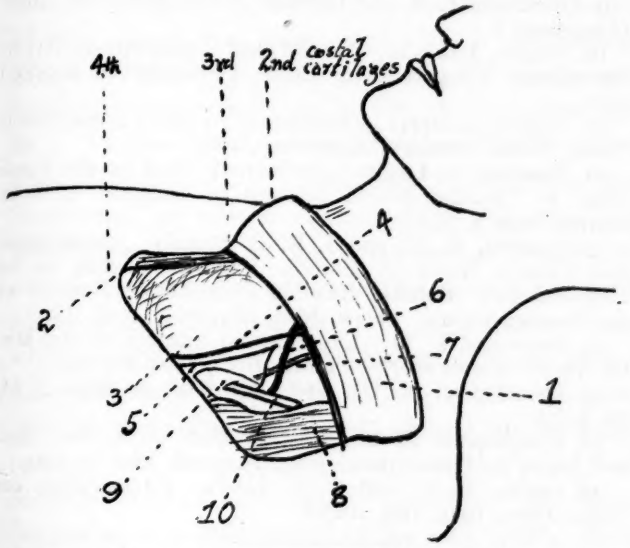

Figure 5. Diagram of exposure of the left auricle in the cadaver. The relations of the left auricular appendix, as it lies curled round the infundibulum, are shown and the manner of exposing it by incising the pericardium between the phrenic and vagus nerves and below the superior intercostal vein. 1. osteoplastic flap; 2. sternum; 3. pericardial sac; 4. phrenic nerve and arteria com. n. phrenici; 5. cut edge of pericardium; 6. superior intercostal vein; 7. vagus; 8. lung; 9. left auricular appendix; 10. handle of knife in auricle.

As early as 1902 both Sir Arbuthnot Lane and Sir Lauder Brunton had suggested the possibility of slitting the narrowed mitral valve with a fine knife, and since that date Cushing, Branch and others have carried out the procedure on dogs. Recently the operation was performed in America upon a girl of twelve, the ventricular route being used.

It was decided to publish this paper in the hope that representing as it does a preliminary communication of a research the writers are engaged upon at present, and with which one of them has been occupied for some years, it may be of use perhaps to others working in the same field by preventing their needlessly covering the same ground and perhaps making the same mistakes.

In the near future it is hoped to supplement the present article by further papers on the same subject and to refer particularly to the selection of cases, the pre-operative treatment, the details of the authors' technic, the choice of an anesthetic and other matters.

While attempting to develop and perfect a sound technic may we not look forward to the time when the specialist in cardiac surgery will deal with mitral obstruction as effectively as the general surgeon of today relieves intestinal obstruction?

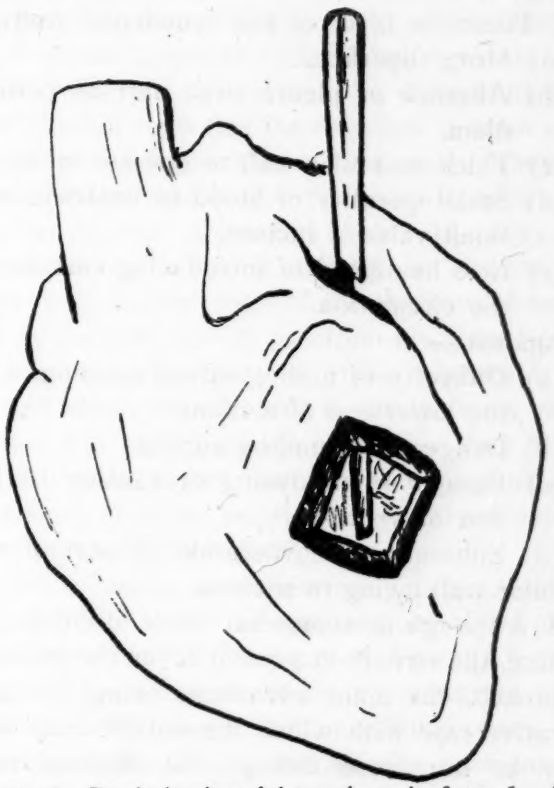

Figure 6. Rough drawing of heart shown in figure 5. After removal from the body it was found the knife had entered the left auricle above the auriculo-ventricular groove and had passed through the mitral opening into the ventricle.

SUMMARY.

1. Surgery has been and may yet be introduced, not to supplant but to aid the medical treatment of certain conditions hitherto regarded as purely medical, and in this category may be placed some cardiac diseases or manifestations thereof, (e. g., angina pectoris).

2. Mitral stenosis beyond a certain stage is from a medical point of view incurable; these cases are otherwise hopeless and however dangerous operation may be, hope is offered thereby for the future.

3. The case of pure mitral stenosis in a young adult whose circulation is failing because of insufficiency of the contents of the left ventricle, invites the application of surgical methods to relieve the auriculo-ventricular obstruction. The lesion is practically a local one and the patient is dying solely because of the obstruction at the mitral valve.

4. The whole object of the operation is to get oxygenated blood into the left ventricle.

5. This is theoretically possible by (a) establishing an extra-cardiac connecting channel, or (b) by opening up the obstructed mitral valve.

6. The latter procedure may be carried out (a) by way of the ventricle, or (b) by way of the auricle.

7. Points in favor of the ventricular route:—

(a) More superficial.

(b) Absence of pleura over part of pericardium.

(c) Thick muscular wall to operate upon.

(d) Small quantity of blood in ventricle until small valve is incised.

(e) Less likelihood of introducing emboli into the circulation.

Against:—

(a) Difficulty of finding mitral opening, e. g., the lower end of a funnel.

(b) Danger of wounding auricle.

(c) Danger of paralyzing or causing fibrillation of ventricle.

(d) Subsequent degeneration of part of ventricular wall owing to sutures.

8. Although a somewhat more difficult procedure, the writers at present favor the auricular approach, the main advantage being the comparative ease with which the mitralotomy knife may be introduced through the stenosed valve, especially when of the funnel type.

9. That portion of the pericardial sac which may conveniently be opened to expose the left auricle, lies between the vagus and phrenic nerves and below the superior intercostal vein.

10. Indications for operation would be deficiency of the left ventricular output as evidenced by: (a) a falling and low blood pressure; (b) smaller volume and force of pulse; (c) absence or reduction of *T* waves in lead 2. of electrocardiogram; (d) indications of the approach of right heart failure.

11. No surgeon can hope to successfully perform the operation for the relief of mitral obstruction without previously devoting much time and patience to the development of what must be a very highly specialized technic.

12. Although much experimental work still remains to be carried out, may we not hope for the sufferer from mitral stenosis in the future, that with the development of a sound technic, the obstruction may be relieved by surgical means?

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TREATMENT OF RECENT POSTPNEUMONIC EMPYEMA.*

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Unless qualified by such term as "pericardial," "mastoid," "gall-bladder," etc., today the word "empyema" stands for a collection of pus in the pleural cavity. Pus in the pleural cavity may be associated with a great variety of pathological conditions. Empyema may follow tonsillitis, influenza, scarlet fever, pharyngitis, measles, laryngitis, peritonitis, bronchitis, typhoid fever—nearly any infectious disease. Suppuration in the pleural cavity may occur after a blow upon the chest; a perforating, penetrating or gunshot wound of the chest. Suppurative pleural effusion may occur during the course of a disease of a neighboring structure, such as suppurative pericarditis, mediastinitis, inflammation of the mediastinal lymph nodes, tuberculous or other inflammation of the lung or pleura, malignant disease of the lung or pleura; disease of the vertebrae, ribs or sternum; infarction or gangrene of the lung; malignant disease of the esophagus or of the stomach; perinephric abscess; abscess of the spleen; acute pancreatitis; liver disease (hydatid, abscess, actinomycosis, suppurative pylephlebitis); subphren-

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ic abscess. Empyema may be secondary to such intraabdominal conditions as: perforated gastric or duodenal ulcer, appendicitis, suppurative cholecystitis, perforation of the transverse colon, etc. One of these intraabdominal affections may cause subphrenic abscess first and empyema afterwards. The esophagus may be perforated by a foreign body or by instrumentation, with resulting empyema. Courvoisier recorded twenty-four cases in which the contents of the gall-bladder escaped through perforation of the pleura and lung (cited by J. McFarland, Surgical Pathology, 1924, p. 587). Empyema may complicate puerperal sepsis (R. A. Johnston and H. J. Morgan, *Bulletin of the Johns Hopkins Hospital,* March, 1922). Malignant endocarditis may cause renal or splenic infarct and an empyema may result by extension of the inflammation through the capsule of the spleen (perisplenitis) and through the diaphragm (diaphragmitis). Suppuration anywhere in the body may cause septicemia or pyemia with secondary empyema. It has long been known that an empyema may be secondary to actinomycosis of the lung (Eugene Hodenpyl, *New York Medical Record,* December 13, 1890, **38**, 656). Suppuration in the pleural cavity may follow pneumothorax.

An empyema may begin as such or follow serous or sero-fibrinous pleurisy. Pneumococci and streptococci are the bacteria most frequently isolated from suppurating pleurae. Many other varieties of microorganisms, however, have been found in the pus of empyemata: colon bacillus, staphylococcus, hemophilus influenzae, typhoid bacillus, tubercle bacillus, actinomyces, Friedlander's bacillus, Giardia intestinalis, bacillus pyocyaneus, the gas bacillus (clostridium aerogenes capsulatus), etc. J. H. Abram and E. Glynn (*Lancet,* August 16, 1919) have recorded two cases of empyema in which paratyphoid bacilli were found. V. R. Mason (*Bulletin of the Johns Hopkins Hospital,* December, 1920) has reported a case of pleural spirochetosis, the pus from the pleural cavity containing spirochaeta bronchialis (Castellaini).

Croupous pneumonia, say Norris and Landis (Diseases of the Chest, 2nd edition, 1920, p. 590) easily ranks first as an exciting cause of empyema; from one-half to two-thirds of empyemata are due to the pneumococcus and about one-quarter to the streptococcus. The symptoms of sepsis and the signs of pleural effusion occurring in a case of lobar pneumonia, after an apparent crisis, make the medical attendant apprehensive of the existence of empyema. He aspirates the chest and finds that the pus contains pneumococci, often in pure culture. These cases are easy to recognize and usually respond well to surgical intervention. Cases of streptococcus empyema occurring with bronchopneumonia, however, may offer the greatest obstacles both to diagnosis and to treatment. In these cases pleural suppuration proceeds apace with active inflammation of the lung and the physical signs are often inconclusive or misleading. So disappointing are the physical signs that the empyema is often a surprise at the autopsy table. (Emerson.) Many clinicians believe with Lemon (*Canadian Medical Association Journal,* December, 1922, **12**, 867) that streptococcus empyema follows no definite rule. The only absolute proof of the existence of empyema is the exhibition of pus from the pleural cavity. These very toxic cases in which empyema is suspected should be submitted to careful *x*-ray examination and to exploratory puncture. Very few of us can make expert roentgenological examinations but many of us are called upon to perform exploratory puncture of the chest.

Before making an exploratory puncture, it is well to recall some of the surface relations of the pleura. The upper limit of the pleura is a point 2.5 cm. (1 inch) above the level of the upper margin of the clavicle. The mesial border of the pleura then descends behind the sternoclavicular articulation to the level of the second costal cartilage where it meets the pleura of the opposite side a trifle to the left of the midline. Both pleurae then descend, parallel, to a point just below the fourth costal cartilage where each deviates from the costosternal articulation. Each pleura now proceeds downward and outward to reach the inferior margin of the seventh rib in the mammillary line, the ninth rib in the axillary line and the twelfth rib posteriorly (Joessel and Waldeyer, cited by G. G. Davis, Applied Anatomy, 1910, p. 195). The lower edge of the pleura is intersected by the scapular line at about the eleventh rib (G. G. Davis). "As the left pleura slopes more rapidly toward the side than does the right, there is a small portion of the pericardium uncovered by the pleura at about the sixth intercostal space close to the sternum" (*ibid.*, p. 201). The lower limit of the pleura may be pushed down by fluid or pulled up by adhesions.

Needles, trocars, tubing and other apparatus used in exploring the pleural cavity should be sterilized and the skin of the patient's chest should be cleansed, shaved, (if necessary) and antiseptisized. If the operator neglects to prepare himself, his apparatus, and the patient with extreme care, he may change

a simple effusion into an empyema. Usually, before the surgeon is consulted, an aspirating needle or a small trocar and stilette has been introduced into the pleural cavity, through the fifth or sixth interspace, in the midaxillary line (or a trifle posterior to this point) or through the seventh or eighth interspace in the posterior axillary line. Dieulafoy's, Bryant's, Potain's, or some other type of aspirator may be attached. For diagnostic purposes a glass hypodermatic syringe will suffice. The more elaborate aspirators are usually out of order when required. The glass barrels of the syringes are often broken because certain nurses insist upon boiling them with the pistons in place. The hollow needle or trocar should have a bore sufficiently large (2mm., 2/25 inch) to permit the passage of thick pus. The hollow needle or trocar should be sufficiently long (at least 7 cm. or 2.95 inches). While the pleural cavity of a child may be reached at a depth of ½ to 1 inch (1,27 to 2.54 cm.), (Griffith. The Diseases of Infants and Children, 1919, Vol. 2, p. 113), the thoracic walls of adults vary considerably in thickness. In the case of a very thin person the anterior thoracic wall may be one inch (1.27+ cm.) or less in thickness while the posterior thoracic wall of an athlete because of thick muscles, may be over two and one quarter inches (6 cm.) in thickness.

Before puncture the skin may be infiltrated with one-half of one percent. procain. The skin may be incised and retracted and the puncture in the intercostal space made in such a manner as to prevent direct communication between the opening in the pleura and the opening in the skin. Such preliminary incision permits of better control of the needle and lessens the chances of skin contamination. With or without preliminary incision, the needle is guided inward and obliquely upward, keeping it close to the upper surface of the rib forming the lower boundary of the selected intercostal space —thus avoiding the intercostal vessels. The periosteum of the rib is sensitive and should not be touched by the needle or trocar. Diminished sense of resistance will indicate to the operator that the point of the needle or of the trocar has entered the pleural cavity.

Failure of pus to flow through the trocar or needle may be due: to negative intrathoracic pressure; to blocking of the lumen by blood clot or fibrinous exudate; to the fact that the pus is in a pocket which the point of the needle has not reached; to the thickness of the pus; to the absence of pus. When repeated punctures have failed to demonstrate pus and the symptoms and signs indicate the presence of an empyema, exploratory thoracotomy is to be performed (A. P. C. Ashhurst, *International Clinics,* 1916, Series 26, Vol. 4). Ashhurst has shown clearly that the surgeon must assume his share of the responsibility of finding the pus.

Roentgenological examination may help to determine the exact spot upon the skin through which the needle or trocar is to be inserted. If necessary, the needle may be introduced under the guidance of the fluoroscope. Encapsulated pus pockets too deep for recognition by sound variation may be localized by the roentgen rays (Capps, Oxford Medicine, 1920, Vol. 5, p. 168). In a case of empyema, fluoroscopy may show the diaphragm rigid and depressed and an opaque area which represents the pus. In a case of empyema, the pus may make a shadow which extends, as a thin layer, between partially collapsed lung and chest wall, practically from diaphragm to apex—a state of affairs rarely if ever observed in cases of serofibrinous pleurisy (Emerson in Tice's Practice of Medicine, 1921, Vol. 5, p. 619). With the fluoroscope a complete surface outline of an underlying cavity can be made out and the depth of the interlobar sacculations measured (Cole and Steiner, Keen's Surgery, Vol. 8, p. 797). In a case of interlobar empyema a dense, almost horizontal band may cross the lung field, in the vicinity of the interlobar fissure, growing wider toward the periphery (Hess, *Canadian Medical Association Journal,* December, 1922, 12, 871). In spite of the truly remarkable aid lent by the modern roentgenologist it may be impossible to find the pus during the patient's life.

When pus is free in the pleural cavity, it has been my custom to remove a portion of the sixth rib in the midaxillary line, incise the pleura and insert a rubber drainage tube. In selecting the sixth rib for resection in the midaxillary line, I follow the teaching of Professor John Chalmers DaCosta (Modern Surgery, eighth edition, 1919, p. 1037). The part of the lung that expands last is beneath this rib. The expanding lung drives out most of the pus and obliterates the cavity. A part only of the pus is drained by gravity. If an incision be made anterior or posterior to the midaxillary line, the expanding lung will block the drainage opening and pus without an outlet will remain in the midaxillary line. With an incision thus located the patient may rest upon his back without interfering with the drainage tube (W. Menzies Hutton, *British Medical Journal,* October 29, 1898, cited by DaCosta). A. P. C. Ashhurst (Surgery: Its

Principles and Practice, second edition, 1920, p. 792) thinks that, if the empyema be massive, the best site for drainage is the ninth or tenth rib below the angle of the scapula. According to Charles A. Powers (Ochsner's Surgical Diagnosis and Treatment, 1921, Vol. 2, p. 264), the elective site is the eighth rib in the midaxillary, postaxillary or scapular line; or, according to T. Turner Thomas (*American Journal of the Medical Sciences,* March and April, 1913, **145**, pp. 405 and 555), "an opening through the eleventh rib or interspace of a given size will drain more perfectly than one at the usual level, etc." In his thesis on empyema, Carl A. Hedblom (*Annals of Surgery,* 1920, **72**, p. 288) tells us that Hippocrates, born 460 B. C., directed that an opening should be made in any existing swelling; otherwise, at the level of the third rib from the last and rather behind than in front. Hippocrates used bistoury, lancet, trocar, trephine or cautery (Hedblom). The splendid results obtained by Heuer (*Annals of Surgery,* December, 1923, **78**, p. 711) in the treatment of infants and children by aspiration drainage recommend it as the operation of choice in such cases. I have had no experience with continuous air-tight suction drainage. I have had very few cases of empyema in children. These were treated by intercostal incision or rib resection.

The question of the size of the opening we may safely make in the pleural cavity is still open for debate. The effects of an open pneumothorax are still under discussion. Graham and Bell (*American Journal of the Medical Sciences,* **156**, 839) concluded in 1918: that whenever a change of pressure is made in one pleural cavity, a change in the other occurs to almost the same extent; that death in open pneumothorax is usually death from asphyxia; that bilateral open pneumothorax is not fatal if the openings are not too large; that marked loss of heat which usually accompanies open pneumothorax is an important and serious factor; that following large openings there is also a serious disturbance in the systemic circulation, probably due to altered intrathoracic pressures, interfering with normal return of venous blood to the heart; that the maximum non-fatal opening to be permitted in the thoracic wall might be calculated from the known vital capacity; that the effects of alterations of pressure in one pleural cavity are influenced by adhesions or thickening of the mediastinal structures; that individuals with high vital capacities can withstand larger openings in their pleurae than those with low vital capacities. Here it may not be amiss to recall a few physiologic facts. The volume of air entering and leaving the air passages during normal respiration is called "tidal air" and can be measured by a Hutchinson (1860) spirometer. "Complementary air" is that amount of air which, after a normal respiration, can still be breathed in by a maximal inspiration. "Reserve air" is that which may be expelled after a normal expiration by a maximal expiration. Hutchinson, who is responsible for the expressions "complementary air" and "reserve air," also terms the sum of tidal, complementary, and reserve air, obtained on following a maximal inspiration by a maximal expiration, the "vital capacity" (Frances A. Welby's translation of Luciani's Human Physiology, Vol. 1, p. 422). Duval (*Presse Médicale,* May 13, 1922) disagrees with the Graham-Bell views, holding that the pleurae of dogs intercommunicate and that therefore experiments on them were not applicable to human beings. He further believes that a large opening in the pleura is less dangerous than a small one. In a later article, (*Presse Médicale,* August 25, 1923, cited by Matas) he admits that he has been wrong in contending that the pleurae of dogs intercommunicate. He says, however, that, experimentally, the pleurae of the dog should be regarded as one cavity because air, blood, and fluid opaque to the *x*-rays pass through the septum from one pleura to the other without any visible breach in the septum. Duval also states that the tenuity and fragility of the mediastinal veil of the dog is such that it cannot resist any differential pressure applied to its surfaces. Therefore, he believes that conclusions based on interpleural experimental surgery of the dog are not applicable to human intrathoracic surgery (Matas). Graham (*Archives of Surgery,* January, 1924, Vol. **8**, No. 1, Part 2) recently has reiterated his theory that the size of a safe thoracotomy opening depends upon the vital capacity. Influenced by the work of Peabody and Wentworth (*Archives of Internal Medicine,* September, 1917), who have shown that the average vital capacity in men is about 4800 c. c., he has increased the size of the permissible opening to about 67 sq. cm. or 10.4 sq. in. from 50 sq. cm. or 8 sq. in. "Those, however, who have exceptionally high vital capacities will be able to endure very large openings; as, for example, 101 square cm., or 15.7 sq. in., in the man whose vital capacity was 7180 c.c." Snyder (*Archives of Surgery,* January, 1924, Vol. **8**, No. 1, Part 2) has summarized his "Studies in Intrapleural Tension" as follows: "There is an essential difference in the mobility of the mediastinum in dog and man; a comparison of the stability

and strength of the structure reveals a marked difference in dog and man; a change in the intrapleural tension of one pleural cavity produces a corresponding change in the opposite side but of different degree in the two instances. In man such a change is more or less compensated for by a deviation of the mediastinum. In the dog the mediastinum is not only freely mobile but also freely permeable to air or fluids, and equalization of the intrapleural tension occurs to a very exact degree; unilateral pneumothorax in the dog cannot be induced; bilateral pneumothorax uniformly results because of the permeability of the mediastinum." In this connection I quote the concluding sentences of the scholarly review of Matas (*Archives of Surgery,* January, 1924, Vol. 8, No. 1, Part 2). Discussing the separate views of Duval and Graham, he says, "In neither case can the conclusions of experimentation in the dog, without artificial aids to respiration by differential pressure or otherwise, be applied in their integrity to human thoracic surgery. I have also endeavored to show that the anatomic differences between the mediastinal septum in the dog and in the human subject are so great, in the sense of the superior resistance and solidity of the human mediastinum, that the two cannot be placed in the same category. In the animal, the mediastinal veil is merely a film, a potential partition, which may become a barrier in pathologic conditions. In man, the mediastinal septum is a composite anatomic wall, which is solidly rooted in the chest through the attachments of its pericardial supports to the diaphragm. It may yield, stretch and even flutter under varying conditions of positive atmospheric pressure, but not to such an extent as to become a negligible quantity in estimating the resistance of the interpleural partition in acute open unilateral pneumothorax."

The epidemic of 1918 taught us, among other forcible lessons, the value of prompt bacteriological investigation of aspirated fluid as well as the importance of examining carefully both lungs; it taught us that when empyema occurs during the active stage of a pneumonia—especially when streptococcus hemolyticus is present—it is better policy to relieve the patient by repeated aspirations, affording the pleura an opportunity to form adhesions, than it is to perform immediate intercostal incision or rib resection. In an emergency, however, when accumulated and accumulating pus so compresses the heart or lung as to threaten life it may be necessary to ease the tension by means of a prompt intercostal incision. I have been treating pneumococcus empyema by rib resection. While it is true that cases of pure pneumococcus empyema have been cured by repeated aspirations, I believe that drainage is more thorough after a piece of rib has been removed.

In cases in which the pus is enclosed in capsules of adhesions (pocketed pus) its location may tax the resources of the most canny of diagnosticians. The empyema may be circumscribed by adhesions between the diaphragm and the lung; the pus may be encysted and located between the visceral and parietal pleurae posteriorly and below; it may be between the pericardium and the lung; it may be pocketed between the lobes of the lung; it may be encapsulated between the wall of the thorax and the lung, etc. The site of the incision and the level of rib resection entirely depend upon the position of the empyema. The position of the empyema is to be determined by the signs and symptoms, by fluoroscopic examination, by exploratory puncture before (and sometimes after) thoracotomy.

As soon as identified, all empyemata should be drained. To wait for the absorption of even a small collection of pus is to encourage the formation of disabling adhesions. Undiscovered or neglected empyemata are usually deforming and often fatal. A massive purulent effusion in the pleural cavity may cause death by direct pressure upon the lung or heart. In the empyema necessitatis nature forces the pus through the chest wall. Adhesions may become so dense as to prevent the lung from expanding. Pressure upon the lung may cause a localized pulmonary fibrosis (Norris and Landis). Thick adhesions may hold the heart in an abnormal position. The diaphragm may become rigid and deformed. An empyema may cause a subphrenic abscess, brain abscess, peritonitis, amyloid disease of the liver, spleen and kidneys, cerebral embolism. An empyema may rupture through the lung and drainage take place through the bronchial tubes. Pneumothorax may result from communication with the bronchial tree. Rupture may take place into the pericardium, stomach or peritoneum. An empyema may cause septicemia or pyemia with metastatic abscesses. An empyema may rupture into the esophagus. The pus from an empyema may make its way to the iliac fossa to form a psoas or lumbar abscess. Hedblom (*Journal of the A. M. A.*, September 22, 1923, 81, p. 1000), speaking of unrecognized cavities, said: "The effect of such delayed drainage was a fibrous membrane over the pleura fixing the lung in a partially collapsed condition, perforation of the pus into the bronchi or through the chest wall, or

both, and septic absorption manifested by emaciation, anemia, arthritis, osteoarthropathy, nephritis, myocarditis and, in certain extreme types, structural deformity of the thorax."

Following thoracotomy for recent empyema, I have usually delayed the installation of Dakin solution for four or five days, hoping thus to lessen the danger from which irrigation of the pleural cavity is not entirely free. Capps (Oxford Medicine, Vol. 2, p. 171) cites Weill's case of convulsions and syncope, Janeway's two instances of transitory paralysis during the injection of hydrogen peroxide, Billing's case of collapse and death after the introduction of a two percent. solution of formalin and glycerin. Capps himself knows of a case of sudden death occurring during the injection of Dakin's solution. There are several cases in the literature of convulsions, syncope and even death following more or less trivial operations upon the chest—puncture, irrigation, introducing a probe, manipulation of a drainage tube, etc. Schlaepfer (*Bulletin of the Johns Hopkins Hospital,* September, 1922) believes that such complications have been proved clinically and experimentally to be caused by air emboli. Owen and Gonzales (*Annals of Surgery,* 1923, **78**, p. 6) have reported a case of pleural epilepsy following the injection of Beck's paste and one of pleural epilepsy and sudden death after the introduction of a trocar. In the same paper, Shallow records three cases of pleural epilepsy from the service of J. Chalmers DaCosta: the first, caused by the passage of food from the esophagus through a fistula into the pleura; the second, due to the installation of hypertonic salt solution; the third, following the introduction of Dakin's fluid. Toland (cited by DaCosta, Modern Surgery, 8th ed., 1919, p. 1018) observed four cases of pleural epilepsy following irrigation with Dakin fluid.

In order to check the postoperative course of empyema systematic bacteriological examinations of fluid from the cavity are made and the wound is not permitted to close until several sterile cultures have been secured. As early as the patient's condition will permit, suitable pulmonary gymnastics are started. It is not always possible in every case to keep in touch with the patient until the empyema is completely cured and pulmonary function restored, but an earnest attempt is made to follow up each case closely. In the cases treated, sunshine, fresh air and ample, nourishing food have been important factors during the stage of reconstruction.

The prognosis is more favorable in empyema of the pneumococcic variety than in that due to the streptococcus. Rib resection, intercostal incision, aspiration—each or all may not succeed because of unrecognized pockets of pus or overwhelming sepsis or toxemia.

SOME PROCEDURES IN MINOR SURGERY.

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SESSILE WARTS.

The speediest and most satisfactory method of removing a sessile wart is, in my experience, the following: The wart is frozen hard with a spray of ethyl chloride and then quickly dug out complete with a small surgical curette (Volkmann spoon). The minute red, and sometimes bleeding, spots at the bottom of the small cavity are the "roots" of the wart, which must be destroyed by touching them with a pointed glass rod dipped in nitric acid. The small wound is then filled with a pledget of simple absorbent cotton, or, if there is oozing, of "styptic cotton", to be held in place with a film of collodion or of "new-skin". The application of the acid is momentarily painful, and the freezing is mildly so, but not the actual removal of the wart. If the wart recurs this means that the "roots" were insufficiently destroyed. The small operation will then have to be repeated.

A wart on the sole of the foot, usually on the anterior weight-bearing area, that is painful and tender, often conceals beneath it a small drop of pus. It is readily treated as just described.

PARONYCHIA.

The text-books describe various incisions and flap-raising operations, for the treatment of paronychia. In certain situations of the suppuration and sometimes in neglected cases, these operations, often performed under narcosis and sometimes associated with removal of part or all of the nail, are, indeed, necessary. The great majority of paronychias, however, are located beneath the nail fold (perionychia), either at its base or, more often, at the side; and, they can be evacuated *without cutting* by the simple device of lifting up the edge of the nail fold with the flat end of a probe, a flat bit of wood (toothpick) or the point of a scalpel held flat against the nail (figure 1). With the elevation of the retaining nail fold and cuticle (painlessly done without a local anesthetic) the pus escapes, the pain disappears and rapid cure follows.

One may, if he sees fit, flood the small abscess

cavity with a drop or two of hydrogen peroxide or of tincture of iodine, but this is scarcely necessary. Unless the paronychia is a very small affair it is, however, often desirable to place under the nail fold, for twenty-four hours, a tiny wick of gauze to promote drainage and to prevent too prompt agglutination of the elevated fold to the nail. A small wet dressing (*vide infra*) is to be worn for a couple of days.

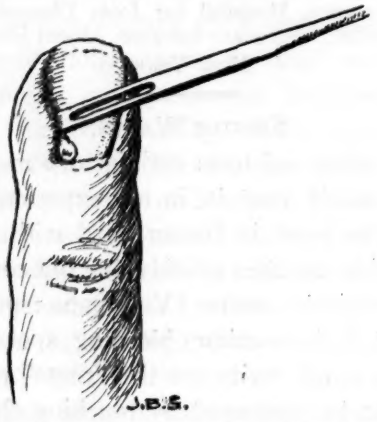

Fig. 1.—Evacuating a paronychia without incision.

SUPERFICIAL FELON.

There is a form of finger felon (the superficial or subepidermal) that often causes much alarm by reason of the pain, fever and swelling that accompany it, but in which the infection is outside of the true skin, appearing as raised, grayish, large or small, sometimes fluctuating areas. The pus lies beneath the epidermis only and the condition is promptly controlled by simply trimming away this raised epidermis and applying a wet dressing.

It must be borne in mind, however, that sometimes a subepidermal suppuration (pustule) is, indeed, the expression of a deeper infection (tendon, bone) and leads into it. It may be recognized by the accompanying signs or symptoms or by the fistulous opening that is exposed when the epidermis is cut away.

ANESTHESIA FOR FINGERS AND TOES.

No part of the body lends itself so readily to nerve-blocking anesthesia as the fingers and toes. A segment of narrow rubber tubing is knotted or clamped about the base. The point of a slender needle, attached to the hypodermatic syringe containing the anesthetizing solution, is thrust just into the skin on the side of the first or the second digit (as the case may require), and a drop of the solution is deposited in the skin. Then, while solution is being slowly expelled, the needle is advanced at right angles to the length of the finger, through the tissues, until it strikes the bone, from which it is slightly withdrawn (figure 2). A few minims are then injected. The procedure is repeated on the opposite side. The digital nerves are thus blocked and the surrounding tissues are also infiltrated. Distal to the injection complete anesthesia is secured.

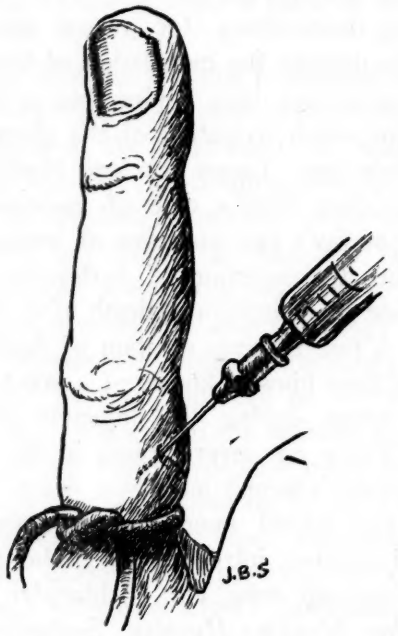

Fig. 2.—Blocking the digital nerves for anesthesia.

INGROWN TOE-NAIL.

The mild grades of ingrown toe-nail, often arising from infection produced by the patient himself, and evidenced by a small granuloma and (or) slight suppuration, may sometimes be cured by conservative measures: burning down the granuloma, if any, with nitrate of silver; pulling the flesh away from the nail edge with a strip of adhesive plaster; packing gauze under the nail edge; and instructing the patient in the care of his toe-nails and choice of shoes. But often even in mild cases, the condition recurs unless a strip of the nail and the corresponding portion of nail root are removed. It is not necessary, however, to remove more than enough of the width of the nail (usually a scant quarter of an inch) to insure against recurrence of the "ingrowing". The removal of a large segment, often recommended, is unnecessarily mutilating and leaves a large raw area to epidermalize. Nor, even when the condition exists on both sides of the nail, is it necessary (except *possibly* in rare, obstinately recurring cases) to remove the entire nail. The removal of a wedge of the flesh on the side of the nail, as often described, makes the treatment protracted and locomotion painful; and it, too, is unnecessary except in those few chronic cases in which there is much hypertrophy of the toe.

Finally, in order to secure with the strip of nail the corresponding portion of the nail root it is usually not necessary to make an incision over the root, as is also generally taught. In most cases the little operation can be performed satisfactorily without any

incision and without assistance, requiring only a pair of straight, *narrow-bladed Mayo scissors* and an artery forceps (in addition to the rubber tubing and syringe for anesthesia, as above described). Beginning at its free end the nail is cut through with the Mayo scissors until the nail fold is reached. Then, by short snips the scissors are advanced subcutaneously or, more properly speaking, under the nail fold, one blade beneath and the other over the nail, until the nail root is cut through (figure 3). With a firm grip of the artery forceps the segment of nail and nail root is then removed in one piece, by manipulation—

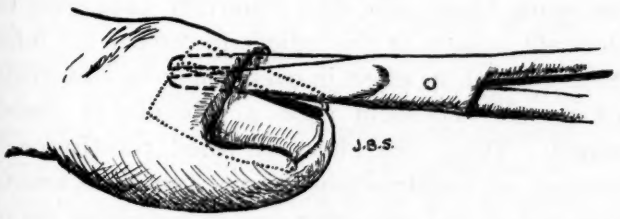

Fig. 3.—Ingrown toe-nail operation. Removing segment of nail and root without incision. The width of the segment is exaggerated in the drawing.

not by a sudden jerk, which may tear the segment in two. The open space is packed with absorbent cotton or gauze, and a moist or wet dressing is applied. Healing takes place in a few days and walking is at no time interfered with.

WET DRESSINGS.

The many physicians who, in their minor surgical work, apply *dry* gauze over accidental wounds and in dressings after incising abscesses, etc, would secure vastly better results and fewer spreading infections if they used instead, as a routine, *moist* or *wet dressings*. Dry gauze and cotton are removed only with pain and the blood or pus drying in and beneath them dam back the wound secretions, producing deeper suppuration. The wet dressing is indispensable in surgery. To keep a dressing wet many surgeons have the patient pour the solution upon it, through the bandage, from time to time. This is a sloppy method: It wets the clothing or bedding and makes awkward or impossible the use of a bandaged extremity for any work or personal service. A dressing may be kept adequately moist or wet for one or two days by placing over, and slightly beyond it, beneath the bandage, a covering of surgeon's rubber tissue ("gutta percha"), of oiled silk, of "cilkloid" or similar waterproof material.

For the benefit of those who may not know it, it cannot be too often repeated that neither carbolic acid nor *any* aqueous solution of phenol or cresol (such as "lysol") should ever be applied as a dressing to the hand or the foot. Even a weak solution left on over-night will cause an irreparable gangrene!*

Safe for wet dressings are boric acid solutions (1%-4%), Thiersch' solution (salicylic acid 1, boric acid 6, water 500), and liquor alumini acetatis (N. F.) to be diluted from its 8% strength to 1% by the addition of water. Wet dressings applied to the fingers or toes cause the skin to appear very white and soggy. This is of no consequence, but it may alarm the patient. It can be largely obviated by mixing with the solution about one-sixth its volume of glycerine or alcohol. In an emergency, if none of these antiseptic solutions is available, use boiled water and keep the dressing moist by a covering of waxed paper, as from a candy box.

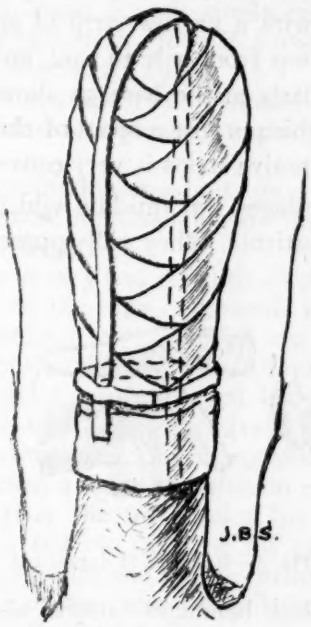

Fig. 4.—Bandage of finger.

BANDAGING FINGERS AND TOES.

For holding a small wet dressing on the finger a rubber finger cot is very convenient. As much of it as is not needed may be trimmed away and the cut end is then fastened to the skin by an encircling narrow strip of adhesive plaster. The cot being quite impervious to moisture the skin beneath may macer-

*Physicians should carry into the homes of their patients and into industrial plants the sermon to discard from their medicine cabinets carbolic acid preparations, bichloride of mercury tablets and other strong poisons. When applied deliberately and, especially, when swallowed by mistake, these are often disastrous in their results. For *every* purpose for which they are used in the household there are safer and better substitutes that the physician can recommend. Even tincture of iodine is dangerous in the medicine closet: its strength increasing by evaporation, it is often applied much too strong and it may be spilled on a child's eyes or face or swallowed by mistake. The laity should be told that a single application of iodine to an open wound does not sterilize it and probably does more harm than good. As a household antiseptic for cuts, wounds, etc., the public should be taught to use, instead of these strong agencies, a stable Dakin solution or chloramine cream preparation, of which one or more are available at the drug stores under trade names. They are better than the strong chemicals and vastly safer.

Incidentally, the physician should also preach in every household where there are small children that lye, vermin exterminating powders, "rough on rats" and all other strong caustics and poisons should never be left about the kitchen.

ate unduly. One may avoid this by snipping one or two tiny holes in the cot which provides for a certain measure of evaporation.

To hold a dressing on a toe or finger it is not necessary to carry the bandage about the foot or hand as is commonly done. It can be made to hold quite securely (and will certainly be more comfortable and more slightly) without this, by merely fastening down the bandage with a narrow strip of adhesive plaster run over the top from base to base, and another strip applied circularly at the base, as shown in figures 4 and 5. For this purpose a spool of chiropodist's narrow Z. O. adhesive strips is very convenient.

Finger bandages soil quickly, which is distasteful to sensitive patients. They will appreciate, therefore,

Fig. 5.—Bandages of fingers and toe.

the use of black bandages—useful also on the scalp.

When not all of the fingers on a hand require a dressing it is an evidence of haste or indifference rather than of neatness and skill, to include them all in a bandage. Whether or not the affected fingers are bandaged individually, those not affected should, if possible, be left free. This obviates their becoming stiff and leaves to the patient some measure of manual function. In any case when two or more fingers or toes are included in a single bandage gauze should always be placed between them.*

*Indeed, in no part of the body, whether axilla, elbow, fingers, toes or breast, should two skin surfaces be left in apposition. It is a common practice to separate them with absorbent cotton. I much prefer to use gauze, for absorbent cotton, unless frequently renewed, packs and becomes "sour" with secretions of the skin, thus often producing instead of obviating a dermatitis.

INJURIES OF THE HANDS AND FEET.

All contused injuries to hands or feet should be *x*-rayed if there is the slightest doubt as to the extent of the injury. The number of unsuspected fractures of phalanges, carpals and tarsals is very large. Unrecognized and improperly treated fractures of these small bones not infrequently result in arthritis, absorption of bone and new bone formation where it is harmful, so that months of disability and often a permanently injured member results. —W. L FINTON in *The Journal of the Michigan State Medical Society.*

THE VALUE OF BLOOD TRANSFUSION IN SUBACUTE AND CHRONIC OSTEOMYELITIS*

MARTIN LEWIS JANES, M.D.
NEW YORK

The remarkably beneficial effects upon the patient generally and upon chronic, suppurating wounds locally, that are apparent after blood transfusion, may be explained as follows: First, its stimulating effect upon the hematopoietic system: the transplantation into the circulation of healthy red blood cells and complement causes a stimulation of the function of the opsonins and the phagocytic power of the white blood cells, thus materially awakening the dormant powers of the patient to combat the infection. Second, its effect in overcoming various grades of anemia dependent upon a subacute or chronic sepsis. Third, the effect of blood transfusion in staying or counteracting various degrees of emaciation and partial marasmus and in increasing the resisting powers, physical, chemical and immunological, of the patient.

The life-saving qualities of blood transfusion in certain conditions are known to all. Our experiences during the war which provided a vast amount of material for conclusive observation, has taught us that no patient suffering from a subacute or chronic infection of any bone in the body should be allowed to carry on his struggle for recovery without the aid of a blood transfusion. To fail to transfuse a patient who is emaciated as a result of chronic sepsis and whose tissues are consequently devitalized, is to shut our eyes and ignore a procedure the value of which, as I shall cite below, is established beyond the realm of speculation or theory.

Methods of Transfusion: That the transfusion of whole, unmodified blood is superior in value to blood adulterated by an anticoagulant, has been proven by various investigators, notably Novy and DeKruif,[1] Drinker and Brittingham[2], Clowes[3] and Unger.[4] Clowes has pointed out the similarity of sodium citrate and sodium chloride as to their general toxic effect upon protoplasm. In a report of 214 transfusions without a chill, the late Dr. Edward Lindeman[5] accounted for those brilliant results by his use of pure, unmodified blood, introducing no foreign material, not even physiological salt solution, into the blood of his patients.

The syringe method, without any doubt, is the greatest advance that has thus far been made in surmounting the mechanical difficulties encountered in

*From the Surgical Service of Dr. Charles Gordon Heyd, N. Y. Post-Graduate Medical School and Hospital. Read before the Harlem Medical Association, New York, March 5, 1924.

blood transfusion. It was with a desire to simplify the transplantation of blood so that with comparatively little skill it could be universally employed by the average physician, and in order also to eliminate the use of saline or other foreign material, that I began, about six years ago, to experiment with various valves and combinations of syringes that would fill that requirement. An apparatus was perfected which was presented before the Surgical Section of the New York Academy of Medicine in 1920, and a description of which has been published.[6]. The machine provides an uninterrupted flow of blood from donor to recipient, requires only one man to operate it and reduces the length of time necessary for a transfusion, two syringes being in action instead of one. No saline solution is necessary to prevent clotting, as there is no stagnation of blood during the course of the operation, the flow of blood from donor to recipient being practically continuous. The apparatus being a one-man affair, enables one to use it in his office or the patient's home without any assistant and with comparative ease.

That blood transfusion is of unquestionable value in subacute and chronic inflammations of bone is quite apparent from observations of the following cases:

CASE I.—P. deP., male, age 7, admitted to Heyd's surgical service at N. Y. Post-Graduate Medical School and Hospital, on August 9, 1923.

Family and previous histories irrelevant.

Five days prior to admission the patient began to complain of pain and tenderness in the right leg. The following day his right leg became noticeably swollen and inflamed. The family physician made a diagnosis of rheumatism and sent him to the Post-Graduate Hospital.

He had, on admission, all the major signs of inflammation of the right leg with involvement of the tibia. The condition started as a periostitis and advanced to an involvement of the bone. Temperature on admission was 105°; pulse 140. Blood count, 17,800; polymorphonuclears 70%, large lymphocytes 25%, small lymphocytes 5%.

Several operations, consisting of incision, curettage and drainage, did not stay the progress and advance of the bone involvement. From the day of his admission to September 26, 1923, he ran a characteristically septic temperature and pulse, fluctuating between 100° and 106° and 110 and 140, respectively.

On September 26th a transfusion of 400 c.c. of blood was performed. Immediately preceding the transfusion, the temperature was 105° and pulse 140. Twenty-four hours after the transfusion his temperature dropped to 102°, pulse 120. Forty-eight hours after the transfusion the temperature was 101°, pulse 132. Seventy-two hours after transfusion the temperature was 99°, pulse 110 for the first time since his admission, both remaining normal thereafter until his discharge January 16, 1924. The improvement in his general condition for which only the blood transfusion could be responsible, resulted in a prompt response of his healing and recuperative powers. The distinct and very apparent improvement in the condition of the wound, following the blood transfusion, was remarkable.

An interesting feature of this case was that practically the entire shaft of the tibia had sequestrated out and a new tibia regenerated from the involucrum and both epiphyseal ends of the bone.

CASE II.—M. G., male, age 58, single, ironworker, admitted to the service of Dr. John F. Connors at the Harlem Hospital, August 26, 1923.

Family and previous histories irrelevant.

On the day of admission he was struck by an automobile.

His physical examination on admission revealed all the signs of traumatic inflammation of the left leg, and was otherwise negative.

A few days later a very bad cellulitis of the left leg and osteomyelitis of the tibia developed, which had a profuse, foul-smelling discharge and was obstinate to all forms of treatment. He ran a typical septic temperature and pulse which ranged between 102° and 105.5° and 90 and 112, respectively. About a month after his admission, at the suggestion of Dr. Connors, I performed a blood transfusion of 500 c.c.

Twenty hours after the transfusion his temperature dropped from 102° to 99° and his pulse from 110 to 80, the temperature and pulse remaining about normal until his discharge three weeks later.

As regards the effect of blood transfusion upon the wound, the following daily notations which accompanied the dressings by the House Surgeon, Dr. Vincent McAuliffe, picture the striking changes brought about by one transfusion of only 500 c.c.:

September 26th—Transfusion of 500 c.c. of whole blood by the Janes method.

September 28—No discharge. Little inflammation of leg present. General condition much improved.

September 29th—Leg clean. No discharge.

September 30th—Inflammation gone. Ulcerated area healing. General condition much improved.

October 1st—Dressed. Condition improving.

October 2nd—No complaints today. Had a good night's rest.

His recovery from then on was uneventful and he was discharged, October 25th, with the wound completely healed.

CASE III.—A. L. R., male, age 40, importer.

Family and previous histories irrelevant.

While playing golf, he stumbled over a stone and fell, sustaining a compound fracture of the right fibula. Infection set in which involved the fragments and surrounding soft tissues, producing a profusely-discharging, foul-smelling wound which resisted the usual treatment of immobilization, curettage and drainage. Cultures from the wound showed streptococcus and staphlyococcus pyogenes aureus and alba.

His blood count was 18,600; polynuclears 80%, small lymphocytes 15%, large lymphocytes 5%. He ran a septic temperature and pulse rate ranging between 101° and 105° and 100 and 130, respectively.

Four weeks after the injury, I performed a blood

transfusion of 1,000 c.c. Thereafter his temperature and pulse gradually diminished and in forty-eight hours reached normal. Following the blood transfusion his wound began to show progressive improvement and he made an uneventful recovery with satisfactory union of the fragments.

The above three cases are typical and were picked at random from a group of 18 cases of subacute and chronic osteomyelitis in which blood transfusion was performed. The results obtained in all of them lead me to the following conclusions:

1. Blood transfusion is an essential measure in combating infection, overcoming anemia and emaciation and stimulating the recuperative powers of a patient.

2. The procedure is indispensable in all cases of protracted suppuration involving bone.

3. It should be performed as promptly as possible to ward off degenerative changes in the vital organs of the body resulting from prolonged suppuration.

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166 WEST 72ND STREET.

HAS THE ERA OF "LAUDABLE PUS" RETURNED?

J. W. KENNEDY, M.D., F.A.C.S.,
PHILADELPHIA

I have said in discussion a number of times that it is today quite useless to write a paper on appendicitis, for it excites no interest, the profession, quite content with its conception of the condition, having become blasè over the story of the appendix. I wish to state in the beginning that there is no subject in all abdominal surgery (and this is my specialty) where privilege and execution stand at such variance, and further, there is no subject in all preventive medicine where knowledge and intellectual execution are so abused.

The title of the paper suggested itself to me on the day of this writing from a remark a physician made. He stated that he had been treating the patient for over a week and that he had finally succeeded in localizing the pus until he had a well-defined abscess and that morning had given a dose of salts, and he now felt the patient was ready for surgery! Two hours after this conversation this patient was operated upon. She had a diffuse peritonitis, with large amount of pus, a large area of the omentum was gangrenous, and there was the familiar perforated and gangrenous appendix. I do not cite this as an unusual case, indeed it is the rule and fashion of the hour. This physician was pleased with the appearance of the abscess, veritably a return of the era of laudable pus!

If the graduate of one of our very best schools is still treating appendicitis with the ice-bag and cathartic after all that has been said in condemnation of the same, and even brags about it, what is wrong and what can be done? I know what is wrong, but my hands are up in the air—there —is no use!

For a number of years I have known that up-to-date treatment in appendicitis can be better taught to the laity than to such members of our profession. Early in my association with Dr. Price, the most brilliant and consistent of all teachers in this subject, we were called to an adjoining state to operate; the patient was a daughter of an artist, a man of unusual intellect and force. After Dr. Price had examined the patient he told the parents that the little girl had a bad appendix and that he was going to remove it immediately. The father strenuously objected. Dr. Price, with his usual force and determination said, "will you and your wife step into the waiting room, I am going to take care of this little girl." He removed a big, gangrenous appendix and then said to me, "do not cut that appendix open, I want to show it to the father and mother." When they were ushered into the operating room, Dr. Price took a pair of scissors and after getting as close to the olfactories of the father as possible, he quickly opened the appendix. The odor from the black and gangrenous organ was so offensive, the father said, "you do not mean to say that vile thing came out of my little girl! Forevermore count me an ardent advocate for early removal of the appendix." Very soon after his son, a student at Yale, had appendicitis, true to the father's promise, he immediately demanded the operation.

On our way back to Philadelphia, Dr. Price said to me "that strong intellectual man will save many lives in the future from the demonstration I made from that odorous appendix," and he told me never to miss an opportunity to teach the intelligent laity the urgency of this work. Further, he made the statement that it had been his experience he could always more easily teach the laity by a single demonstration than the profession by many operations and discussions. This has been my experience many

many times. It seems absolutely impossible to make our profession stop using the ice-bag and cathartic! I will compromise with them and consent to the ice-bag and give them a great amount of gratitude "to boot" if they will cease using the deadly cathartic which has raised our surgical mortality. It seems necessary to give them something to play with and the ice-bag does its principal harm in the relief of pain which keeps the patient from us until a late hour; but the cathartic is deadly in its execution, first, last and always. If the physician simply will not have his patient operated upon, and he naturally has to do something, he had better throw his ice-bag out the window, take away food and water and give an injection of morphia; but, again, of course this is all wrong. I have used every argument possible against the cathartic, I have played with the subject, I have likened the intestine to a water-hose with a weak point and assumed that this weak point is a possibly perforated appendix and then asked colleagues if they would risk forcing more water into the hose, trying to bring out the point that the extra pressure of water was the cathartic and that appendicitis must always be looked upon as a potentially perforated bowel. I have pointed out the fact that the symptoms of appendicitis most forcibly teaches its treatment in that nausea means no food or drink, no food means no peristalsis, that the obstipation of appendicitis was Nature's effort to put the bowel at rest in order to favor repair and localization, so that the cathartic was exactly what was not wanted—but we get no where in our teaching.

I want to say to my surgical friends that so long as there is a teacher in America who is advocating a watchful waiting in appendicitis, irrespective of its stage, they must not blame the general profession for this "laudable pus," they are welcoming its return and it has become a product of their teaching. I resent such teaching as a personal affront: it gives me unnecessary deaths; it contaminates my institution and endangers the lives of other patients; it multiplies the post-operative complications and blacks the eye of surgery, for late surgery breeds later surgery; a surgical death never brings the next patient in that community at an earlier hour, but at a later one; and there is no end to the units of destruction and calamity that are never properly weighed and measured.

I have tried to point out to my friends who are advocates of the "physiological era in surgery" and are advocates of classifying appendicitis into operable and non-operable stages based upon supposed stages in the condition, that such is impossible, as signs and symptoms are not proportionate to the underlying pathological condition. I have further pointed out that all such teaching moves all urgent abdominal conditions to a later operable hour.

Over fourteen years ago I took the position in surgical literature that the teaching of the physiological surgeon had taken from us the progress of over a quarter of a century of advanced teaching and that the adoption of waiting for the quiescent stage in appendicitis or its complicating peritonitis would enormously increase the percentage of drainage cases. During the last six months over eighty per cent of the appendiceal cases operated in the Joseph Price Hospital have been extensively drained for a peritonitis, and this is what I referred to when I prophecied that the endorsement of the physiological age in surgery would sound the death knell in privileged work. Cannot men see that it is absolutely impossible to drive the profession to a uniformly early operation in this urgent condition unless they stand as a solid phalanx for first hour surgery irrespective of the stage of the condition!

Permit any teacher to say that there is a tomorrow in appendicitis and he has lost force and his stand is reprehensible in that it permits the general profession to wait for that tomorrow. There is no treatment of appendicitis other than operation. The diagnosis of appendicitis means operation the first hour irrespective of the stage, and when teachers endorse this view we shall get results. I no longer hold the general practitioner responsible for delays and death. I hold the teacher of the physiological era responsible; he has attempted a classification he has never been nor can be able to make; he has assumed an extent of peritonitis which his surgery has never been sufficiently thorough to confirm or deny and he has based such assumption upon a wrong premise which had for its foundation signs and symptoms and not a revelation of the real extent of the underlying pathology. Therefore, his entire work is surrounded by a fog which I have seen dissipated many hundreds of times by my own work and that of Joseph Price, who was a radical toilet operator and always exposed the full extent of the pathological condition. The physiological surgeon must take his head from under the sand, he will then learn that many of the cases he has placed on the waiting list for subsidence of a diffuse peritonitis were never anything but a very local condition and that the general tenderness and distension were due to a paralysis of the last few inches of the ileum and that the remainder of the bowel was free from peritonitis. I say the physiological surgeon will learn this when he goes after the appendix and travels in his toilet of the peritoneal cavity to the extent of the peritonitis. No surgeon who had ever in reality been a toilet operator and

knows from sight the extent of the usual complicating peritonitis following the perforated appendix could ever have endorsed any of the working factors of the "physiological" surgeon, as they have all been based upon a false idea of the extent of the pathological condition which was based upon external symptoms and signs.

I have written elsewhere upon this subject in detail and it is useless to say more. The adoption of the physiological era in surgery has given us the return of the era of laudable pus.

UNCOMMON RECTAL FISTULAE.*

HARRY GOLDMAN, M.D.,
Attending Proctologist, Hospital for Joint Diseases,
NEW YORK.

A fistula, connected with or situated near the rectum, is a pathologic condition that necessitates the utmost care in examination, operation and after-treatment to bring the case to a successful termination. Although simple from external appearance, with its one or more innocent-looking openings, only a careful pre-operative examination will avoid embarrassment from a later discovery that the physician is dealing with one of the uncommon types, a few examples of which follow. Cases 1 and 2 have a rectal connection, and cases 3 and 4 simulate rectal fistulae.

CASE I.—G. M., 49, single, colored, house cleaner, was referred to my clinic on account of a rectal fistula. He denies venereal infection. Two and a half years ago he began to suffer from constipation, having had one period of 24 days without a movement. He was operated upon at one of our large hospitals for a small fistula that had developed and for the relief of his constipation. His condition became worse, and he now has a constant desire to move his bowels, new fistulae have developed and his stool contains pus and blood. On external examination we found a number of fistulous openings leading to the rectum, evidence of operation for fistula posteriorly, and an unhealed wound in the anterior anal region. On rectal examination a number of smooth masses, some with superimposed ulcerations, were found. The rectal caliber is diminished in the middle third. A punched specimen show round-cell infiltration in an inflamed mucosa; no evidence of malignancy. The Wassermann reaction is negative. The pupillary reactions are, however, very sluggish and roentgenography of the tibiae (a diagnostic aid much used in this institution in determining the presence of syphilis) shows an osteoperiostitis. Tenesmus was greatly relieved and the patient gained 24 pounds under antiluetic treatment. The fistulae are secondary to the luetic affection of the rectum.

CASE II.—G. L., storekeeper, referred on account of small fistula that had developed recently near the anal opening. His physician advised him that I might be able to operate in my office and allow him to go home. There was no history of abscess, but he had bleeding from the rectum with unsatisfactory movements. This was considered merely a hemorrhoidal symptom. From external examination the fistulous opening appeared innocent, but on digital examination a cauliflower mass with a crater ulcer was felt on the left lower wall of the rectal ampulla, which on section proved to be adenocarcinoma. The fistula lead directly to the new growth.

CASE III.—Mrs. F. L., 38, housewife, came to my office for advise regarding a fistula and for relief from pain in the coccygeal region. Her rectal history was negative, but last summer she fell on her buttocks while roller skating and since then has had pain which lately has become greatly aggravated, a fistula having meanwhile developed. Methylene blue, injection into the fistula, was not recovered from the rectum and digital examination was negative except for pain when pressing posteriorly. Probing lead directly to roughened bone, an osteomyelitis of the coccyx.

CASE IV.—W. S., 17, clerk, was referred to me for a fistula operation. At the age of four, he suffered from lumbar Pott's disease and was apparently cured after two years treatment. He enjoyed fair health up to a few months before I saw him, when he began to suffer with constipation, which became more severe in spite of treatment. He awoke one morning with a discharging sinus in the posterior anal region and from that time his constipation was relieved. This, like another case that I saw with Dr. Finkelstein at this institution some years ago, was a tuberculous sinus leading to disease in a lumbar vertebra, where the pus, instead of following the psoas fascia, continued behind the anterior vertebral ligament to its attachment to the sacrum, where it formed a sac, pressing on the rectum and eventually causing obstruction. This was relieved by rupture in the lower portion, finding an exit in the ano-coccygeal line, the external opening of the fistula.

From the above short histories it may readily be seen that though the symptoms be few, one may be dealing with a grave condition. A complete examination, with the aid of the laboratory and roentgenography where necessary, should always be made of every patient with symptoms in the region of the rectum. Furthermore no physical examination is thorough that does not include investigation of the lower intestinal tract.

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*Read before the Clinical Society of the Hospital for Joint Diseases, March 11, 1924.

ROENTGEN DIAGNOSIS.

The clinician should retain his seat at the head of the council table. He should know the limitations of roentgenology and of the man who is using it, for men vary in skill in different parts of the same field. He should weave the laboratory reports and his own knowledge into a coherent, reasonable, logical diagnosis, one that he would accept if he himself were the patient.—RUSSELL D. CARMAN in *New York Journal of Medicine.*

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New York City

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THE MALIGNANCY OF GIANT-CELL SARCOMA OF THE LONG BONES.

The belief has long prevailed that giant-cell sarcoma of the long bones—also called myeloid sarcoma, giant-cell tumor (Bloodgood) and hemorrhagic osteomyelitis (Barrie)—is a benign or only "locally malignant" disease. This opinion has been fortified, especially, by the studies of Bloodgood, to whom we are indebted for popularizing the treatment by complete curettage and chemical cauterization rather than by resection or amputation. (See his article in this JOURNAL, May, 1923).

Last month before the Surgical Section of the N.Y. Academy of Medicine, Constantine McGuire of New York presented a critical analysis of a series of cases of sarcoma of the long bones from some of the large hospitals of New York, in which there were available for review the tumor tissue, roentgenograms, clinical histories and end-results. This analysis provided several interesting and important observations (to be published in the *Archives of Surgery*) and, especially, it shatters the notion that giant-cell sarcoma of the bones is essentially or, at any rate, uniformly a benign growth. In one case (tibia) it recurred fatally in the thigh stump after amputation and in some others it was fatal through distant metastases.

McGuire's observations find ample support and corroboration in the highly interesting article on "The Prognosis in Giant-Cell Sarcoma of the Long Bones" by Wm. B. Coley in *Annals of Surgery*, March and April, 1924. Excluding instances of involvement of the jaw, spine, sacrum, ilium and sternum (and one of the ulna: "seen in consultation; resected by Dr. Bloodgood; well 10 years") Coley reports 50 cases of giant-cell sarcoma of the long bones as follows: radius 9—no deaths; humerus 6—4 fatal; tibia 13—3 fatal; femur 22—2 fatal. This is a total of 9 deaths from metastases*—a mortality from the neoplasm itself of 18%. Coley criticises the monograph of Nélaton (1860) as a sufficient basis for the belief that this type of bone tumor is benign, and he reminds us that nineteen years later Gross "reported five cases of myeloid or giant-cell sarcoma associated with metastases of the lungs."

Thus rudely aroused from a complacent acceptance of giant-cell sarcoma as a benign bone tumor, our first reaction might be to question the diagnosis in the metastasising cases. But in both McGuire's and Coley's series the histologic examinations were by experienced pathologists—several of them by Ewing or Bloodgood or by both of them. Occasionally the malignancy of a giant-cell tumor has been prognosticated histologically. More often it has been discovered in a review of the slides after it has manifested itself clinically, and Coley properly questions the diagnostic value of such a revision of findings after the patient is known to have died.

The lesson that these analyses conveys is that one should give a guarded prognosis of giant-cell bone sarcoma (even of the jaw, for epulides are not *always* benign).

Therapeutically these studies bring nothing new. In all cases of bone tumor it is proper to perform a biopsy before undertaking removal. Clinical and roentgenographic examinations alone may be misleading both as to the malignancy of the growth and also, sometimes, in differentiating neoplasm from syphilis or other infection. Enough tissue should be removed for thorough examination. It does not appear that incision into bone tumors increases the danger of metastasis (a process which, in other varieties of bone sarcoma, is, with or without biopsy, well-nigh inevitable). In the admittedly malignant forms of bone sarcoma amputation rarely saves life or prolongs it. In instances of giant-cell sarcoma, albeit they may prove to be malignant clinically, amputation is seldom indicated—at least at the outset. Coley regards as the best method of treating these giant-cell tumors:

*In two of the cases that we have here included as fatalities the patients are recorded as having metastases and growing worse, though still alive in February, 1924.

a. Exploratory operation with curettage of all the tumor tissue that it is possible to remove;

b. Swabbing out the cavity with pure carbolic acid and alcohol, or zinc chloride;

c. Packing the cavity tightly with gauze to control hemorrhage;

d. Putting up the limb in a circular plaster-of-Paris cast if there is any danger of pathological fracture;

e. Keeping the cavity clean with Dakin's solution;

f. Systemic treatment with the mixed toxins of erysipelas and bacillus prodigiosus [Coley's fluid] for a period of three or four months, supplemented with at least one massive dose of radium in the form of a pack; *e. g.*, 12,000 mc. hours at 10 cm. distance over three areas if available; if not, *x*-ray may be used;

g. If the disease recurs in spite of curettage and prophylactic treatment, a second, or even a third curettage may be employed, combined with further use of either toxins or radium. If at the end of six months the disease is still progressing, resection or amputation may be indicated;

h. Primary amputation should very rarely be performed in any type of central giant-cell sarcoma without a prolonged preliminary trial of conservative treatment;

i. Clinical evidence of malignancy: rapid growth, breaking through the bony shell—should outweigh the histological evidence of a benign giant-cell tumor, and in cases of this type, amputation should be performed after a brief trial of conservative treatment, if the disease is not controlled.

Progress in Surgery

Selections from Recent Literature

Periarticular Fibroma of the Skin. (*"Synovial" Lesion of the Skin*). LOUIS SAVATARD, Manchester, England. *Archives of Dermatology and Syphilology*, April, 1924.

American writers have described these peculiar tumors under the name synovial lesions of the skin. The situation of the fibromas, their gelatinous contents and the apparent extension of their capsule to the articulation, suggested that they were intimately related to the synovial membrane of the interphalangeal articulations. Hence, on clinical grounds they were considered to be of synovial origin. MacKee and Andrews confirm this finding by roentgenographic and histologic examinations. Montgomery and Culver apparently on clinical inspection alone, emphatically deny their synovial connection, and state that they are merely cystic warts.

Savatard reports three cases with a small tumor on the dorsal aspect of the terminal phalanx of the thumb or finger.

His investigations lead him to the conclusion that we have here tumors clinically indistinguishable but varying in origin. He cannot agree that the old name of "synovial lesions of the skin" should be retained, for most of these tumors are not of synovial origin. Roentgenotherapy seems to be the ideal treatment.

The So-called Tendovaginitis Crepitans. (*Über die sogenannte Tendovaginitis Crepitans*). G. HAUCK, Berlin. *Archiv für Klinische Chirurgie*, Volume 128, 1924.

This disease is characterized by a puffy swelling usually related to extensor tendons, and most commonly the extensor carpi radialis longus and brevis. It may occur slowly in occupations in which there is constant trauma or it may develop suddenly as after a strain in athletics, or marching or dancing. The changes found consist of infection of the bloodvessels and serous fluid in the tissue adjacent to the tendon proper but not in the tendon sheath. There is infiltration around the bloodvessels of round cells, lymphocytes, polymorphonuclear leucocytes and eosinophile cells. Crepitation is produced by pressure on the tissue separated by extravasated lymph and blood.

The condition is not a tendovaginitis, but a paratenonitis crepitans, for the tendon sheath is not at all affected.

Unrecognized Fractures of the Skull in Infants and Children ALFRED W. POLLAK, New York. *Medical Journal and Record*, April 2, 1924.

Every child during infancy or childhood has fallen on or was struck on the head. In most instances there were no bad results or even marked symptoms. Many of these children undoubtedly received fractures of the skull and recovered without other symptoms than those of mild shock. If there are no major symptoms of depression or hemorrhage accompanying the fracture, the diagnosis is often overlooked.

The immediate symptoms in these cases when of sufficient importance to be noted at the time of the injury were due to meningeal irritation and congestion or to concussion of the brain. The symptoms may come from very slight hemorrhages which are gradually absorbed and the symptoms relieved. Many of the obscure brain conditions of later life may have their origin in mild degrees of concussion. Therefore a guarded prognosis should always be given.

In every case where a child has fallen or been struck upon the head, an *x*-ray examination of the skull should be made and a careful history should be taken in order that no fracture of the skull should be overlooked.

A New Incision for Clavicle Operations. ROBERT SOUTTER, Boston, *The Journal of the A. M. A.*, April 12, 1924.

The incision advocated by Soutter and used by him in a case in which it was necessary to remove a large deformity of the clavicle due to an old united fracture, extended from the spine of the scapula over the deltoid posteriorly, upward over the shoulder and downward anteriorly to the level of the fourth rib just internal to the anterior axillary line and then at right angles 1 inch inward, the line of incision being placed where it could be easily covered by a dress shoulder strap. The skin and subcutaneous fat were dissected from the pectoral muscle and laid back, not appreciably lengthening the time of the operation.

Acute Osteomyelitis of the Vertebrae. (*Ostéomyélite aiguë vertébrale*). CH. MATHIEU, Nancy. *Revue de Chirurgie*, No. 2, 1924.

Osteomyelitis of the vertebrae may be divided into two groups: (1) the acute, due most frequently to the staphylococcus aureus; (2) the subacute, following some infectious disease, such as typhoid. Only the first variety is considered in this article, a form usually found in adolescents, i. e., at a time when the complemental centers of ossification make their appearance. Boys are affected in two-thirds of the cases. Trauma seems to play an important part. The lumbar region is most commonly affected (53% of all cases), and the infection may produce an extraosseous abscess spreading into the spaces adjacent to or within the spinal column The affection may be accompanied by a more or less intense meningeal reaction. Clinically the acute process is characterized by sudden sharp pain in the lumbar region, fixation of the spine, rise in temperature and pulse, chills, the picture at first resembling typhoid, pneumonia, pleurisy, peritonitis, etc. About the 8th or 10th day the picture is more than ever one of typhoid, but locally there arises a fusiform swelling which contains pus. The mortality of 46% makes it a serious condition. The treatment is always surgical. The author reports 5 cases coming under his observation.

The Lumbosacral Region. An Anatomic Study and Some Clinical Observations. H. L. VON LACKUM, New York. *The Journal of the A. M. A.*, April 5, 1924.

In a recent review of fracture dislocations of the spine treated at the New York Orthopedic Dispensary and Hospital during the last twelve years, it was found that the majority of those injuries took place in the lumbosacral region. Interest was particularly aroused when the usual factors of occupation and type of injury were ruled out, as sole provocative agents in this selective action, and the review seemed to indicate that many cases of obscure low back pain, of so-called sacroiliac strain and relaxation and of sciatica, were due to an inherent instability of the part. A study was therefore undertaken to determine, if possible, the cause for the selection of this site of injury, and whether responsibility might not rest, in part at least, on the anatomic arrangement of the region. Thirty bodies were used, five of which were female. The conclusions arrived at are: 1. The lumbosacral joint is an unstable mechanism because (a) it is the juncture of a mobile and an immobile part: (b) the usual means of joint stabilization are at a disadvantage in consequence of a developmental structure designed for the all-four position;

(c) it is the site of rotating action which is often asymmetrical; (d) it is the site of tremendous shearing strain. 2. The strain at the joint is always shearing, regardless of position. 3. The shape of the first sacral is of primary importance in reducing this strain because of its bearing on the angles which either increase or decrease it. 4. Backache may be caused by an increased angle and consequently increased strain. 5. Backache following long bed rest or acute illness may be the result of so-called normal strain which cannot be controlled by the weakened muscles. 6. The occurrence of fractures and dislocations in this region is facilitated by the rotating action in the joint. 7. Anatomic deformities in this region are active causes of disability and deformity. 8. Fusion can be done without fear of affecting the usefulness of the part.

Gastric Ulcer, the Pylorus and Motility. (*Magengeschwür, Pylorus und Motilität*). TH. BÁRSONY, Budapast. *Wiener Klinische Wochenschrift,* March 6, 1924.

The general opinion is that the 6 hour residue found in cases of ulcer of the stomach is due to spasm of the pylorus, no matter where the ulcer may be. Bársony states that this may be true of ulcers at the pylorus, but in cases of ulcers situated at a distance from the pylorus, the condition is reversed, and there is not only not a spasm in the latter case, but the pylorus is more than normally relaxed and patent. This is due to a muscular depression from irritation in the wall of the stomach of the ulcer.

The End-Results of Gastroenterostomy Together with a Contribution to the Indication and Contraindication of Gastroenteroanastomosis in Ulcer of the Stomach and Duodenum. (*Über Folgezustände nach Gastroenterostomie nebst einem Beitrag zur Indikation und Kontraindikation der Gastroenteroanastomose bei Ulcus im Gastroduodenaltractus*). A. OHLY, Cassel. *Archiv für Klinische Chirurgie,* Volume 128, 1924.

Gastroenterostomy is a non-physiological operation. Beside vicious circle, narrowing, acute atony of the stomach, intussusception of intestine, there can occur dyspepsia, marked back flow of bile and thereby anacidity that may lead to dyspepsia, disturbance of the external secretion of the pancreas, peptojejunal ulcer, recurrence of ulcer or formation of a new ulcer, and gastro-jejuno-colonic fistula. Gastro-enterostomy aside from late results does not stop bleeding or perforation.

The indications for gastroenterostomy are: (1) for advanced pyloric stenosis with secondary distention of the stomach; (2) ulcer near the pylorus, when, through a perigastric inflammatory process and attachment to the neighboring organs a marked disturbance in motility is produced, and, (3) stenosing post-pyloric or duodenal ulcers that are not possible of resection on technical grounds.

The contraindications: (1) all ulcers at a distance from the pylorus; (2) ulcers near the pylorus or duodenum when there is a tendency to small or large hemorrhage, (bleeding to death may occur through little erosions, the location of which is difficult to ascertain even at operation); (3) callous ulcers that give suspicion of carcinoma, and (4) in all spastic and neurotic conditions in which there is a disturbance in motility due to pylorospasm.

In observations extending over many years the author found only 38.3% of healed cases after gastroenterostomy.

Acute Pancreatitis. LEWIS F. SMEAD, Toledo, O. *American Journal of Obstetrics and Gynecology,* April, 1924.

Acute surgical conditions of the pancreas include the non-inflammatory pancreatic necrosis and true inflammatory pancreatitis. Acute pancreatic necrosis is probably due to activated pancreatic ferments escaping into the pancreas and surrounding tissue. The activating agents may be bile, duodenal contents, or infection. The frequency of gall-stones and infections of the gall-bladder and ducts is certinly significant. The cause of the profound shock is absorption of autolyzed pancreatic tissue.

The most helpful diagnostic points are the severity of the pain, the collapse, and the extension of the epigastric tenderness to the left. The object of surgical intervention is to remove dangerous toxic substances, prevent the extension of the pathologic process, and avoid future attacks.

Genito-Urinary Tuberculosis. HENRY G. BUGBEE, New York. *New York State Journal of Medicine,* April 4, 1924.

Some of the points which Bugbee emphasizes in his discussion of urinary tuberculosis are: First, that the disease is at first localized to one kidney; second, the destructive lesion is progressive and all efforts on the part of nature to heal such a process are unsuccessful in nearly every case; third, patients complaining of prolonged urinary frequency and painful micturition should be suspected of having a tuberculous process; fourth, either a positive diagnosis or an elimination of the possibility of tuberculosis should be sought in every such case; fifth, temporary disappearance of symptoms and of tubercle bacilli from the urine should not be accepted as a cure for intermittence of symptoms is characteritic of the disease; sixth, nephrectomy carried out before the disease has become disseminated, followed by proper care after operation results in a cure in a very large percentage of cases.

The Removal of Dental Infection as an Aid in the Treatment of Urological Diseases. ALBERT M. CRANCE and CHARLES F. BULLOCK, Geneva, N. Y. *The Urologic and Cutaneous Review,* April, 1924.

Foci of infection and especially dental foci, account for a great many urinary lesions, either directly or indirectly, due to the fact that a great many of these dental foci were present prior to the appearance of the urinary lesions.

The types of urological lesions in which dental, or other foci of infection should be removed, are chiefly renal infections, particularly streptococcus, staphylococcus or colon bacillus infections, renal and ureteral calculi, bladder infections and especially those showing ulceration, chronic prostatitis and vesiculitis, chronic non-specific urethritis, urinary tuberculosis of any part, and tumors. Illustrative cases are reported.

Carcinoma of the Cervix Associated with Pregnancy. N. SCHILLING, New Hampton, Iowa. *American Journal of Obstetrics and Gynecology,* April, 1924.

Carcinoma of the cervix associated with pregnancy is a rare combination. Trauma incident to labor or abortion is an important etiologic factor. Women who have borne many children in rapid succession are most likely to develop this condition. Accordingly, for a year subsequent to pregnancy multipara should be watched with especial care for the early evidences of malignancy.

So long as it remains local, carcinoma of the cervix does not cause sterility. In rare instances carcinoma of the cervix may coexist with pregnancy for an extended period without exhibiting any clinical manifestations. As a rule there exists a certain "parallelism" between the stage of pregnancy and the degree of advancement of the malignant growth.

In the majority of cases the carcinoma antedates the pregnancy. But it is not always an easy matter to determine this question. That there is a comparatively benign and a more malignant type of carcinoma has often been observed. And it is more than likely that statistics of extraordinary results, in a small series of cases, depend largely on this circumstance.

It has not been proved that the incidence of pregnancy invariably causes the tumor to grow with increased rapidity. Excision of a piece of the cervix will injure neither mother nor fetus. Carcinoma of the cervix complicated by pregnancy must be differentiated from placenta previa, varicose veins, accidental hemorrhage and benign tumors.

"Therapeutic abortion is strictly contraindicated in these cases." Just how much consideration is to be given the unborn child will depend on the ethical sensibilities of the patient and her physician.

The False Paths of Surgery. (*Irrwege der Chirurgie*). F. LIEK, Danzig. *Archiv für Klinische Chirurgie,* Volume 128, No. 3, 1924.

After MacDowell's ovariotomy many thousands of normal ovaries were removed, though this sacrifice has gradually lessened. This is frequently the tendency in surgery,—to

overstep the mark of a real or fancied surgical principal. It is seen in the case of visceral neuroses, in which operations are performed and no relief obtained because no organic visceral defect existed. Many conditions are held responsible, but are really not, for symptoms that the patient experiences. These conditions include chronic oophoritis, floating kidney, epigastric hernia, chronic appendicitis, gastroptosis, and movable cecum.

The operations for movable kidney are useless. So also with partial colectomy for obstipation, with appendicectomy for so-called chronic appendicitis in cases of normal appendices, and in gastropexy for gastroptosis. Stomachs are hitched up that are normally low for the individual, and what appears to be a high stomach postoperatively, may be only temporarily so, and the next minute may be down low. The element of suggestion is marked in these cases and "cures" may depend upon the surgeon rather than upon the operation. One must remember the wide range of the normal position of the viscera and expect cures by operation upon conditions that are not pathological, but are merely incidental findings.

Book Reviews

Applied Pathology in Diseases of the Nose, Throat, and Ear. By JOSEPH C. BECK, M.D., F.A.C.S., Associate Professor of Laryngology, Rhinology and Otology, University of Illinois College of Medicine; Chief of Staff, Otolaryngology, North Chicago Hospital, Chicago. Octavo; 280 pages; 268 illustrations and 4 color plates. St. Louis: C. V. MOSBY COMPANY, 1923.

Too much praise cannot be given to the author, not for the work accomplished, but for his striving to correlate pathology and a clinical subject. This is rarely done in American text-books, particularly those concerning the specialties. Usually too much stress has been placed on the purely mechanical or purely clinical aspects of a subject. The realization that all medicine and surgery rests upon a basis of pathological concepts has in the past accounted for the success and popularity of Berlin and Vienna as centers of instruction.

The book, however, suffers by its limitations. The author states that it is the result of his own personal experiences, therefore we must find something lacking, for no one man's experience is encyclopedic. For example, R. Kramer, of New York recently reported 17 cases of hemangioma and lymphangioma of the larynx, yet no mention is made of these entities. The drawings are in great part poor, particularly the few colored ones done in a ghastly red. The photomicrographs are printed too dark so that the cells are quite indistinct. And yet the book is doing pioneer work among American text-books of surgery.

Surgical Pathology. By JOSEPH MCFARLAND, M.D., Sc.D., Professor of Pathology in the Medical Department of the University of Pennsylvania. Octavo; 701 pages; 435 illustrations. Philadelphia: P. BLAKISTON'S SON & COMPANY, 1924.

This is an interesting and readable volume. Indeed, it was prepared especially for continuous reading, although, to be sure, it is of service also as a book of reference. The text is divided into three parts. Part I (200 pages) is a consideration of Congenital Conditions of Surgical Interest—defects, deformities, neoplasms, etc., classified according to their mode of origin. This leads naturally to the subject of Tumors in general, which constitutes Part II (also about 200 pages). Part III (about 300 pages) is devoted to Special Pathology as concerned in the surgical affections of the various tissues and organs of the body. Many interesting sections will be found in this part, as in the other two, for example, the discussion of the affections of the breast.

Urologisches Praktikum mit besonderer Berücksichtigung der instrumentellen. Technik für Arzte und Studierende. Von PROFESSOR DR. I. COHN, Berlin. *Zweite Auflage.* 12 mo.; 399 Seiten; 91 Abbildungen und 3 Tafeln. Berlin und Wien: URBAN & SCHWARZENBERG, 1924.

This is an excellent manual of urology with particular emphasis upon the nonoperative part. The major operative procedures are omitted entirely, but good and complete descriptions are given of methods of urological treatment outside the operating room. By compactness of style and by tables the author has produced an excellent outline of the subject. However, it is typically German in that little credit is given to foreign work. The phenolsulphonephthalein test, for example, is curtly dismissed in one sentence as having no especial advantage over other methods.

Hernia and Its Radical Cure. By J. HUTCHINSON, F.R.C.S. Eng.; Consulting Surgeon, London Hospital; Examiner in Surgery, Glasgow University; etc. Octavo; 264 pages; illustrated. London: HENRY FROWDE and HODDER & STOUGHTON, 1923.

This small book is of interest only as representing the author's opinions (he opposes the congenital theory of hernia) and his operative preferences, briefly described and crudely illustrated. As a monograph it is very inadequate.

Döderlein-Krönig Operative Gynäkologie. Bearbeitet von DR. MED. ET. DR. ART. OBS. H. C. ALBERT DÖDERLEIN, Geheimer Hofrat, O.ö., Professor der Geburtshilfe und Gynäkologie; Direktor der Universitäts-Frauenklinik, München. *V. Auflage.* Mitt 445 teils farbigen Abbildungen und 16 farbigen Tafeln. Leipzig: GEORG THIEME, 1924.

The fifth edition of this well-known classic has been revised by Döderlein alone. It is the second edition which has appeared since Krönig's death.

Functional uterine hemorrhages, in this book on *operative* gynecology are treated purely by radiation therapy. In the case of myoma and carcinoma, radiation is placed before operative prevention.

On the whole, although many small changes and additions have been made, the volume presents its former aspect. Among the new operations Bumm's collifaxation for complete prolapse may be mentioned. Scheppelmann's plastics on the abdominal wall for pendulous abdomen, and the beautiful illustrations of the Schubert technic of fashioning a vagina by utilization of the rectum are new.

An interesting chapter, written by Ernst Beling on the legal liabilities of the physician in regard to the undertaking or refusal to perform operations has been appended, based, of course, upon the German statutes.

The beauty of the illustrations and the excellent typography have been kept to the mark of previous editions.

Cancer: Nature, Diagnosis, and Cure. By FRANCIS CARTER WOOD, M.D.; Director, Institute for Cancer Research, Columbia University. **Man and the Microbe:** How Communicable Diseases are Controlled. By C. E. A. WINSLOW, DR. P. H.; Professor of Public Health, Yale School of Medicine. **Community Health:** How to Obtain and Preserve It. By D. B. ARMSTRONG, M.D., Sc.D.; Executive Officer of the National Health Council. **The Baby's Health.** By RICHARD A. BOLT, M.D., Gr. P. H.; Director, Medical Service, American Child Health Association. **Personal Hygiene:** The Rules for Right Living. By ALLAN J. MCLAUGHLIN, M.D.; Surgeon, United States Public Health Service. 16 mo.; about 18,000 words each; flexible covers. New York: FUNK & WAGNALLS, 1924.

These comprise the initial unit of five volumes of the 20-volume National Health Series, edited by the National Health Council, and written by leading health authorities of the country for popular instruction. The other fifteen volumes are to be published in units of five titles, the series to be completed by May 1, 1924.

Colonic Therapy in the Treatment of Disease. By O. BORN SCHELLBERG. Octavo; 202 pages; 23 figures. New York: AMERICAN INSTITUTE OF MEDICINE, INC., 1923.

In his plan of colonic therapy Mr. Schellberg essays to pass the irrigating tube to the cecum itself. Whether or not this is always possible and safe, it has been learned roentgenographically that enema fluid can reach the cecum without it. The author is one of many who regard variations in the outline and position of the colon that are within the limits of normality as pathological; and he assumes that changes in the outline and position following colonic therapy are due to it. That alterations of the intestinal flora can be secured by artificial bacterial implantations is yet to be established scientilcally. Much of the benefit secured must be attributed to the lavage.